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(54) **TRANSCRIBER OF TRANSFER FILM.**

(57) The technical field of this invention relates to a transcriber of a transfer film that transfers a painted film to the surface to be transferred. Heretofore, no such a low-price simple tool has been available that efficiently transfers painted film to the surface to be transferred. Since the transcriber of this invention is composed of a pay-out reel (2) that pays out tape (1) where the transfer film transferable to the surface (4) to be transferred by pressing or heating is retained, a take-up reel (7) that is capable of freely taking up the paid out tape (1), a head (5) that makes contact with the tape (1) paid out from the pay-out reel (2) or the transfer film separated from the tape (1) and presses or heats them and transfers the transfer film to the surface (4) to be transferred, and a case (6) that houses the pay-out reel (2), the take-up reel (7), and the head (5), it can transfer the transfer film to the surface to be transferred efficiently, easily and accurately despite its low price. The transcriber of this invention is suited to perform attachment, erasing, gluing of characters, images simply.

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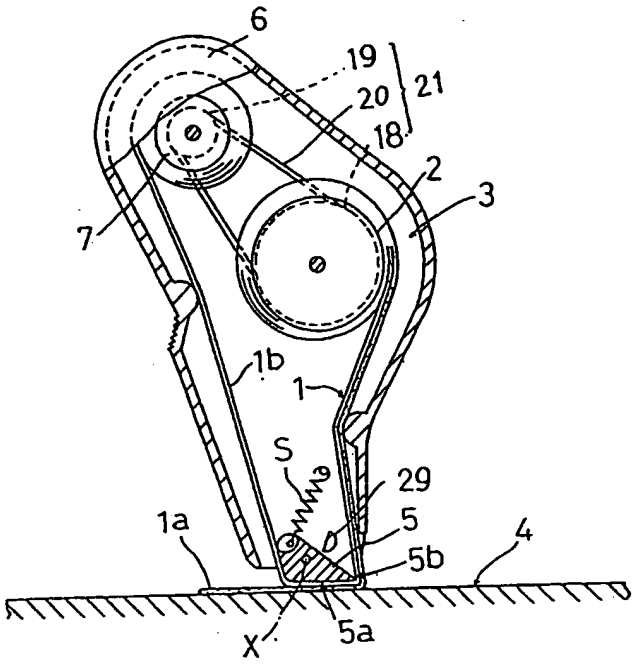
FIG. 7



TRANSFER FILM TRANSFER DEVICE

[INDUSTRIAL FIELD]

The present invention relates to a transfer film transfer device, and more particularly to a transfer film transfer device for transferring a paint film suitably mixed with a pigment, a binding agent, a dispersing agent and the like to a receiving surface for the purpose of easy erasing or easy pasting of characters and pictures, and a transfer film transfer device such as an adhesive film transfer device for transferring an adhesive layer supported in film form to a receiving surface of paper for the purpose of bonding sheets of paper.

[BACKGROUND ART]

Conventionally, when carrying out easy erasing of characters and pictures or easy pasting of characters and pictures, or when transferring a paint film suitably mixed with a pigment, a binding agent, a dispersing agent and the like to a receiving surface, or when transferring an adhesive layer supported in film form to a receiving surface of paper for the purpose of bonding sheets of paper, a transfer or pasting operation is effected by applying an ink eraser, or manually peeling a release sheet disposed between films and pressing a film on a receiving object.

However, such a manual operation is inefficient, and therefore transfer cannot be effected efficiently although only a simple operation is involved. Further, there has been a very strong demand for an inexpensive transfer film transfer device to be realized.

The present invention has been made having regard to such state of the art, and its object is to provide a transfer film transfer device which solves the above problem and also allows a used tape to be taken up on a takeup reel.

[DISCLOSURE OF THE INVENTION]

A transfer film transfer device according to the present invention is characterized by comprising;
a feed reel for winding and storing, prior to feeding, a tape having a transfer film formed in film form which is transferable to a receiving surface by pressing or heating, and a takeup reel for taking up the tape fed,
a head for contacting and pressing or heating, for transfer to the receiving surface, the tape fed from the feed reel or the transfer film separated from the tape, and
a case housing the feed reel, takeup reel and head.

With such a transfer film transfer device, the transfer film may be transferred to the receiving surface easily and reliably by placing the transfer film in contact with the receiving surface.

Since the construction is simplified, the cost can be reduced.

The takeup reel is provided so that a used tape may be taken up on the takeup reel, which is convenient in use.

Further, it is desirable that the above transfer film transfer device further comprises frictional transmission means having a roller disposed in a torque transmitting portion between the feed reel and the takeup reel and rotatable following one of the two reels and having a peripheral surface thereof in frictional contact with the other reel for frictional transmission,
wherein the two reels have different diameters or the frictional transmission means comprises a roller rotatable with the takeup reel and inscribing an inner surface of the feed reel, so that the takeup reel has a takeup rate always equal to or exceeding a feed rate of the tape by the feed reel, and
the difference in the two rates is absorbed by utilizing slippage occurring at the peripheral surface acting as a frictional contact portion of the roller.

According to this construction, the diameter ratio between the two reels or the form of the frictional transmission means is such that the takeup rate is always equal to or exceeds the feed rate. Consequently, the tape fed from the feed reel is taken up on the takeup reel without relaxing after use.

Since the difference between the two rates is absorbed by utilizing the slippage, the difference in rate is canceled out through the absorption utilizing the slippage although the quantity of the tape wound and stored on the feed reel and the quantity of tape wound on the takeup reel vary with use.

Moreover, the frictional transmission means forms a main component of a drive section of the transfer film transfer device, which renders the construction simple and requiring a reduced number of components.

As described above, the tape is taken up reliably since it is taken up on the takeup reel without relaxing after use. Further, since the difference in rate is canceled through absorption utilizing the slippage, the used tape is reliably taken up on the takeup reel without breaking, for example. In addition, the cost of the transfer film transfer device is reduced since the main portion of the transfer film transfer device has a simple construction including

a reduced number of components.

The transfer film transfer device of the present invention may further comprise a circulating endless body to function as frictional transmission means provided between a feed-side pulley rotatable with the feed reel and a takeup-side pulley ratable with the takeup reel,
the two pulleys having different diameters so that the takeup reel has a takeup rate always equal to or greater than a feed rate of the tape by the feed reel, and
the difference between the two rates is absorbed by utilizing slippage occurring at least partly between the circulating endless body and the two pulleys.

That is, the tape fed from the feed reel is taken up on the takeup reel without relaxing after use since the feed-side pulley and takeup-side pulley have different diameters so that the takeup rate is always equal to or greater than the feed rate.

Since the difference between the two rates is absorbed by utilizing the slippage, the difference in rate is canceled out through the absorption utilizing the slippage although the quantity of the tape wound and stored on the feed reel and the quantity of the tape wound on the takeup reel vary with use.

Moreover, the two pulleys and the circulating endless body wound thereon constitute main components of the transfer film transfer device, which renders the construction simple and requiring a reduced number of components.

As described above, the tape is taken up reliably since it is taken up on the takeup reel without relaxing after use. Further, since the difference in rate is canceled through absorption utilizing the slippage, the used tape is reliably taken up on the takeup reel without breaking, for example. In addition, the cost of the transfer film transfer device is reduced and compactness is achieved since the main portion of the transfer film transfer device has a simple construction including a reduced number of components.

Preferably, the pressure head includes a facial press portion for facial contact with the transfer film and pressing it on the receiving surface, a linear press portion for linear contact in a transverse direction with the transfer film pressed on the receiving surface and pressing it on the receiving surface, and urging means for urging the linear press portion to a position to press the transfer film on the receiving surface.

According to this construction, the pressure head is switchable to a position in which the facial press portion presses the transfer film on the receiving surface the urging force of the urging means by pressing the pressure head against the receiving surface. Then the pressure head is moved with the facial press portion pressing the transfer film on the receiving surface to cause the transfer film to adhere to the receiving surface. After effecting the adhesion, the pressure head is moved away from the receiving surface. Then the pressure head is switched under the urging force of the urging means to a position in which the linear press portion concentratedly presses a part of the transfer film on the receiving surface. At this time, the linear press portion presses, on the receiving surface, a downstream end of the adhering transfer film with respect to a direction of movement of the pressure head, namely an adhesion terminal end. Thus, when a tension acts on the transfer film with movement of the pressure head away from the receiving surface, the adhesion terminal end of the transfer film is readily separable along the straight linear press portion concentratedly pressing the terminal end. Consequently, the transfer film has the terminal end in a substantially fixed linear shape.

It is thus possible to cause the transfer film to adhere to the receiving surface reliably with a substantially uniform adhesive strength by the pressing action of the facial press portion of the pressure head. In addition, when separating the transfer film in the direction of feed, the adhesion terminal end of the transfer film may be formed in a substantially fixed shape by the action of the linear press portion of the pressure head. These achieve an excellent and reliable transfer of the transfer film to the receiving surface.

The transfer tape may be wound in a pancake form on the feed reel, with a pressure contact mechanism provided for causing a pressure contact between an outer periphery of the transfer tape as wound and an outer periphery of the transfer tape taken up on the takeup reel, rotation of the pancake-like transfer tape and rotation of the takeup reel being interlocked through the pressure contact caused by the pressure contact mechanism. This construction has the following advantages.

The feed rate of the transfer tape and the takeup rate thereof may be maintained at substantially the same rate despite a reduction in the diameter of the pancake-like transfer material and an increase in the winding diameter of the transfer tape taken up on the takeup reel occurring with use of the transfer tape.

Consequently, there is no need for a slip mechanism as required where the rotary shaft of the transfer material and the rotary shaft of the takeup reel are interlocked through a gear mechanism, which allows for a simplified construction.

Where the pressing section causes an entire width of the transfer film formed on the tape to be transferred to the receiving surface, the takeup reel takes up only the base material stripped of the

transfer film. This is convenient in achieving a neat and facilitating stability of the pressure contact by the pressure contact mechanism.

Preferably, the pressure head includes a linear edge formed downstream of a pressure surface with respect to a running direction of the head and extending transversely of the tape, the pressing surface and an imaginary plane including the linear edge and contacting a peripheral surface of the case cross each other with the case in between. This construction has the following functional advantages.

The case, with the pressure surface of the pressure head pressing the paint film on the receiving surface, may be swung on the edge downstream with respect to the running direction of the pressure head. Thus, at the transfer terminal position, the edge is used to hard press the downstream end, with respect to the running direction of the pressure head, of the paint film pressed by the pressure surface, to form a linear strong adhesion portion extending transversely of the edge at the transfer terminal position of the paint film. The paint film is readily breakable along the linear strong adhesion portion when a tension acts on the paint film with movement of the edge away from the receiving surface. This forms the transfer terminal end of the paint film in a linear fixed shape.

Thus, the paint film may be transferred with a substantially uniform adhesive strength with the pressure surface of the pressure head from transfer starting position to transfer ending position, with the transfer terminal end of the paint film formed in a substantially fixed shape.

Preferably, a running means is provided for causing the tape fed from a storage section storing the tape to be fed, to run along a fixed path, a scraper pressed on the transfer film of the tape running along the fixed path for separating the transfer film from the base material, and a pressing section for pressing on and transferring to the receiving surface the transfer film separated by the scraper. This construction has the following advantages.

With running of the tape, the transfer paint film is separated from the base material by the action of the scraper, and only the separated transfer paint film is pressured by the pressing section for transfer to the receiving surface.

Since only the separated transfer paint film is pressured by the pressing section on the receiving surface, the transfer paint film once caused to adhere to the receiving surface does not easily become peeled regardless of the adhesive strength of the transfer paint film relative to the receiving surface and to the base material. Thus, the transfer paint film may be transferred to the receiving surface reliably.

The scraper and the pressing section may be arranged non-adhesive to the transfer film. This allows the transfer film to run smoothly from the scraper to the pressing section.

The pressing section may be defined by a peripheral surface of a pressure roller for guiding the transfer film separated by the scraper toward the receiving surface, a cutter being provided for cutting the transfer film wound on the pressure roller. This allows the transfer terminal end of the transfer film to have a fixed shape.

Where the head is capable of varying a pressing or heating width for the paint film transversely of the tape, the following advantages are assured.

The paint film may be transferred in varied widths even if the tape has a paint film having a fixed width, by varying a width of pressing or heating by the head. Thus, a convenient paint film transfer device is provided which can vary the transfer width of the paint film according to a desired width of the range of the receiving surface even where a tape having a paint film of a fixed width is used.

The transfer section that heats and soften or fuse the heat sensitive transfer paint film of the tape for transfer to the receiving surface may be rotatable in contact with the pressure sensitive transfer film to heat and soften or fuse the pressure sensitive transfer film, the softened or fused pressure sensitive transfer film being transferred in the softened or fused state from the base material of the tape to a peripheral surface of the heating roller, and with rotation of the heating roller the pressure sensitive transfer film transferred to and held on the peripheral surface being transferred to the receiving surface. This construction has the following advantages.

The heat sensitive transfer film is transferred from the base material to the peripheral surface of the heating roller, and the heat sensitive transfer film transferred to and held on the peripheral surface of the heating roller is transferred to the receiving surface.

The heat sensitive transfer film is first transferred in the softened or fused state from the base material to the peripheral surface of the heating roller, and the heat sensitive transfer film transferred to and held on the peripheral surface of the heating roller is transferred to the receiving surface, instead of transferring the heat sensitive paint film supported on the base material directly to the receiving surface. The heat sensitive transfer film once caused to adhere to the receiving surface does not readily peel off and therefore does not damage the receiving surface even if the heating roller acting as a heating element inadvertently become lifted from the receiving surface to discontinue heating.

That is, the heat sensitive transfer film to be transferred is heated and softened or fused as sandwiched between the heating roller and the receiving surface, and the periphery of the heating roller is in contact with the softened or fused heat sensitive transfer film. Therefore, even if the periphery of the heating roller should inadvertently become lifted from the receiving surface, the periphery of the heating roller and the heat sensitive transfer film to be transferred would readily separate, and the heat sensitive transfer film once caused to adhere to the receiving surface does not readily peel off.

Further, a construction may be provided which comprises a storage section storing a tape to be fed, which tape has a heat sensitive type adhesive layer formed on one face of a base material, a heating and pressing member for application that heats and presses a heat sensitive type adhesive layer of the tape to transfer it to a receiving surface, a feed mechanism for feeding the tape from the storage section as the heating and pressing member for application is run while being pressed on the receiving surface, and feeding the heat sensitive type adhesive layer to a heating and pressing surface of the heating and pressing member for application, and heating and pressing means for bonding to heat and press the heat sensitive type adhesive layer again which has been applied to the receiving surface. This construction has the following advantages.

When the heating and pressing member for application is run as pressed along a desired receiving surface position, the tape is fed from the storage section and the heat sensitive type adhesive layer is delivered to the heating and pressing surface of the heating and pressing member for application. The transfer film thus delivered is successively heated and pressed for application to the receiving surface.

A thin object such as paper to be bonded is placed on an upper surface of the adhesive layer applied to the receiving surface, and the heating and pressing means is used for heating and pressing again to complete a bonding operation.

Instead of sandwiching the heat sensitive type adhesive layer not having developed adhering strength between bonding surfaces, the heat sensitive type adhesive layer is applied in advance, by heating and pressing, to the receiving surface which is one of the bonding surfaces. Thus, there is no possibility of the heat sensitive type adhesive layer alone becoming displaced between the bonding surfaces, which assures a bonding position not displaced from what is desired.

This construction allows the tape having the heat sensitive type adhesive layer formed on one face of the base material to be fed with running of the heating and pressing member for application, the heat sensitive type adhesive layer being fed successively to the heating and pressing surface for application to the receiving surface. The heat sensitive type adhesive layer applied to the receiving surface is heated and pressed again by the heating and pressing means for bonding. Thus, a bonding operation as a whole may be carried out efficiently and conveniently.

Where a case having a coating transfer means includes a film removing device for removing the coating film transferred to the receiving surface, the transfer material transferred outside a transfer region by an error in handling the case may be removed promptly with the film removing device.

Thus, in the event of a transfer operation error, the unwanted transfer film transferred outside a transfer region may be removed easily and quickly without the need to search for a cutter or the like as in the prior art.

The film removing device may comprise a scraper switchable between a use position projecting outwardly of the case and a non-use position contained in the case. In this case, when the scraper acting as the film removing device is out of use, a situation may be avoided in which a finger or the like becomes hurt by a sharp part of the scraper. This provides the advantage of securing safety in a normal transfer film transfer operation.

Further, the film removing device may include a tape with an adhesive layer formed on one face of a film-like base material and having a greater adhesive strength than cohesion between the receiving surface and the transfer film, a tape storage for storing the tape to be fed, and a pressure head for pressing the adhesive layer of the tape unwound and fed from the tape storage. According to this embodiment, the pressure head pressed on an unwanted transfer film transferred outside a transfer region. In this state, the pressure head is moved upstream with respect to a direction of tape feed. Thereafter, the tape is moved away from the receiving surface, thereby peeling the unwanted transfer film in one stroke, to carry out the film removal operation speedily.

The case may include a rotatable film removing member for removing the transfer film transferred to the receiving surface , and a torque applying means manually operable for applying torque to the film removing member. This construction has the following advantage.

Since the case per se that has the transfer film transfer device includes the film removing member of the manually rotatable type, when the transfer film is transferred outside a transfer region on the receiving surface, the unwanted transfer film outside the transfer region may be removed promptly by placing the film removing member in contact

with the transfer film outside the transfer region and forcibly rotating the film removing member by a manual operation.

Thus, in the event of a transfer operation error, the unwanted transfer film transferred outside the transfer region may be removed easily and quickly without the need to search for a cutter or the like as in the prior art. Moreover, little effort is required since the film removing member is rotatable under manual control, which also allows the construction as a whole simple and compact.

A removing means may be disposed on a running path of the tape fed from a storage section storing the tape to be fed, upstream of a position opposed to the head, for removing a side of the transfer film from the tape in a way to vary a removal width. This construction has the following advantage.

The paint film may be transferred in varied widths even if the tape has a paint film having a fixed width. This is achieved by pressing or heating the paint film after removing a side of the paint film in a selected width from the tape.

Thus, a convenient device is provided which can vary the transfer width of the paint film according to a desired width of the range of the receiving surface even where a tape having a paint film of a fixed width is used.

[BRIEF DESCRIPTION OF THE DRAWINGS]

Fig. 1 is a side view in vertical section of a transfer film transfer device according to the present invention; Fig. 2 is a perspective view showing a use state thereof; Fig. 3 is a side view in vertical section of a further embodiment; Fig. 4 is a partly broken away plan sectional view showing a still further embodiment; Fig. 5 is a side view in vertical section of a principal portion of Fig. 4; Fig. 6 is an explanatory view showing a use state; Fig. 7 is a partly broken away plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 8 is a plan sectional view of a principal portion of Fig. 7; Figs. 9 (a), (b), (c) are explanatory views of a use method; Figs. 10 (a), (b) are plan sectional views of a principal portion showing a transfer film transfer device in a still further embodiment; Fig. 11 is a plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 12 is a sectional view taken on line XII-XII of Fig. 11; Fig. 13 is a side view of a principal portion of Fig. 12; Fig. 14 is a side view of a principal portion of a still further embodiment; Fig. 15 is a plan view of a principal portion; Fig. 16 is a plan view of the principal portion; Fig. 17 is a sectional view taken on line XVII-XVII of Fig. 16; Fig. 18 is a plan sectional view of Fig. 14; Fig. 19 is a plan sectional view showing only a case; Fig. 20 is a partly broken away plan sectional view of a transfer film transfer device in a still further embodiment; Figs. 21 (a), (b), (c), (d) are explanatory view of a use state; Fig. 22 is a partly broken away plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 23 is a sectional view taken on line XXIII-XXIII of Fig. 22; Fig. 24 is a sectional view taken on line XXIV-XXIV of Fig. 22; Fig. 25 is a plan sectional view of a principal portion of a transfer film transfer device in a still further embodiment; Fig. 26 is a sectional view taken on line XXVI-XXVI of Fig. 27 showing a partly broken away plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 27 is a partly broken away plan sectional view; Fig. 28 is a plan view of a transfer film transfer device in a still further embodiment; Fig. 29 is a partial sectional view taken on line XXIX-XXIX of Fig. 28; Fig. 30 is a sectional view of a principal portion of Fig. 28; Fig. 31 is a partly broken away plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 32 is a sectional view taken on line XXXII-XXXII of Fig. 31; Fig. 33 is a sectional view taken on line XXXIII-XXXIII of Fig. 31; Fig. 34 is a partly broken away plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 35 is a sectional view of a principal portion of Fig. 34; Figs. 36 (a), (b) are explanatory view of a use method; Fig. 37 is a partly broken away plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 38 is a partly broken away plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 39 is a sectional view taken on line XXXIX-XXXIX of Fig. 38; Fig. 40 is a sectional view taken on line XXXX-XXXX of Fig. 38; Fig. 41 is a partly broken away plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 42 is a sectional view of a principal portion of Fig. 41; Fig. 43 is a partly broken away plan view showing an operation for removing an unwanted pressure sensitive transfer ink film; Fig. 44 is an enlarged fragmentary sectional view of a transfer film transfer device in a still further embodiment; Fig. 45 is a plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 46 is an enlarged sectional view of a principal portion of Fig. 45; Fig. 47 is a sectional view of a principal portion showing an operation for removing an unwanted pressure sensitive transfer ink film; Fig. 48 is a plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 49 is a sectional view of a principal portion showing an operation for removing an unwanted pressure sensitive transfer ink film; Fig. 50 is a plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 51 is a

sectional view of a principal portion showing an operation for removing an unwanted pressure sensitive transfer ink film; Fig. 52 is a plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 53 is a sectional view of a principal portion showing an operation for removing an unwanted pressure sensitive transfer ink film; Fig. 54 is a plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 55 is a side sectional view of a principal portion; Fig. 56 is a sectional view of a principal portion showing an operation for removing an unwanted pressure sensitive transfer ink film; Fig. 57 is a plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 58 is a side sectional view of a principal portion; Fig. 59 is a side sectional view of a principal portion of a transfer film transfer device in a still further embodiment; Fig. 60 and Fig. 61 are explanatory views showing processes of removing an unwanted pressure sensitive transfer ink film; Fig. 62 is side sectional view of a transfer film transfer device in a still further embodiment; Fig. 63 is a developed sectional view of Fig. 62; Fig. 64 is a partly broken away plan sectional view of a transfer film transfer device in a still further embodiment; Fig. 65 is an enlarged view of a principal portion thereof; Fig. 66 is a side view showing the principal portion thereof; Fig. 67 is a partly broken away plan sectional view of a transfer film transfer device in a still further embodiment; and Fig. 68 is a side view showing a principal portion thereof.

[BEST MODE FOR CARRYING OUT THE INVENTION]

Embodiments of the present invention will be described hereinafter with reference to the drawings.

In Fig. 1 and Fig. 2, 1 is a picture revising tape 1 having a white pressure sensitive transfer paint film lightly adhering in film form to a base material. A feed reel 2 holding the picture revising tape 1 wound thereon in a roll form to be fed out, and a pressure head 5 for pressing on a receiving surface 4 the pressure sensitive transfer paint film of the tape 1 fed from the feed reel 2, are mounted in a case 6, which constitute a principal portion of a paint film transfer device which is one example of transfer film transfer devices according to the present invention.

The feed reel 2 and a takeup reel 7 each comprise a combination of an approximately ring-like main body 2a, 7a acting as a core for winding the tape 1, a pivoted part 2b, 7b extending coaxially with the main body 2a, 7a and inserted and supported, while containing a compression coil spring 8, 9, in a pivot hole 6a, 6b defined in a suitable position of the case 6. The main bodies 2a, 7a of the two reels 2, 7 are in the 1:1 inside diameter ratio, but the outside diameter ratio is set so that the takeup reel 7 has a takeup rate always equal to or exceeding a feed rate of the tape 1 by the feed reel 2 (specifically, the taken-up tape winding diameter is equal to or greater than the feed tape winding diameter even when the tape 1 is fed little from the feed reel 2).

A spherical roller 10 is disposed at a torque transmitting portion between the feed reel 2 and the takeup reel 7 to contact edges of inside diameter surfaces of the main bodies 2a, 7a thereof. The roller 10 is urged from the feed reel 2 and from the takeup reel 7 by the action of the springs 8, 9, thereby to be prevented from falling off and to secure frictional forces occurring at contact portions of the above-mentioned edges. The roller 10 has a peripheral surface at one side thereof in frictional contact with an inner surface of the main body 2a of the feed reel 2, to roll following rotation of the feed reel 2, and the rolling movement rotates the takeup reel 7 through a frictional contact of a peripheral surface at the other side thereof with the main body 7a of the takeup reel 7. Thus, the roller 10 acts as frictional transmission means F between the feed reel 2 and takeup reel 7. The difference between the feed rate of the feed reel 2 and the takeup rate of the takeup reel 7 is absorbed by utilizing slippage occurring on the peripheral surfaces serving as frictional contact portions of the roller 10.

The tape 1 fed from the feed reel 2 passes through the pressure head 5 where the paint film is pressure-transferred to the receiving roll surface 4, and is thereafter taken up on the takeup reel 7. The tape 1 becomes twisted in its running paths and, in order to eliminate sagging of the tape 1 due to the twist, guide rollers 11, 12 in the form of truncated cones are provided adjacent the feed reel 2 and takeup reel 7, respectively.

With this transfer film transfer device, the tape fed from the feed reel is taken up on the takeup reel without relaxing after use since the outside diameter ratio between the two reels 2, 7 is set so that the takeup rate is always equal to or greater than the feed rate. The difference in rate is absorbed and canceled out by utilizing slippage on the peripheral surfaces of the roller 10. Moreover, the drive section of the transfer film transfer device has a simple construction and includes a small number of components, with the frictional transmission means F using the roller forming a main element thereof.

The shape of the roller 10 need not be spherical but may be in the form of a ball on an abacus, for example.

A different embodiment will be described next.

As shown in Fig. 3, an embodiment is conceivable where the frictional transmission means F comprises a cylindrical roller 13 having a small diameter, which inscribes the inner surface of the feed reel 2 and extends sideways from the takeup reel 7 to be rotatable in unison with the takeup reel 7. In this case, the rotational force of the feed reel 2 is frictionally transmitted to the takeup reel 7 through the cylindrical roller 13 having a small diameter. Consequently, the takeup reel 7 rotates at a higher speed than the feed reel 2, whereby the rate of taking up the film 1 by the takeup reel 7 is always equal to or greater than the rate of feeding the film 1 by the feed reel 2. Moreover, the difference between the two rates is absorbed by slippage occurring on peripheral surfaces of the roller 13.

The foregoing embodiments are applicable to a paint film transfer device used for pasting characters and pictures and an adhesive film transfer device used for bonding paper together as well as a paint film transfer device used for picture revision.

The present invention is applicable also to a transfer film transfer device of the type in which the head contacts and transfers the transfer film after the transfer film is separated from the tape. The present invention is applicable also to a transfer film transfer device of the type in which the transfer film is heated and transferred by the head.

In the foregoing embodiments, the drive is primary-transmitted to the feed reel. The transfer film transfer device may be constructed such that the drive is primary-transmitted to the takeup reel to rotate the takeup reel, the torque thereof being frictionally transmitted to the feed reel through the described roller to rotate the feed reel.

A further embodiment will be described.

In Figs. 4-6 (Fig. 6 shows a use state), 1 is a picture revising tape 1 having a white pressure sensitive transfer paint film 1a lightly adhering in film form to a base material 1b. A storage section 3 having a feed reel 2 holding the picture revising tape 1 wound thereon in a roll form to be fed out, and a pressure head 5 for pressing on a receiving surface 4 the pressure sensitive transfer paint film 1a of the tape 1 fed from the storage section 3, are mounted in a case 6, which constitute a principal portion of a paint film transfer device which is one example of transfer film transfer devices according to the present invention.

The tape 1 runs from the feed reel 2 past a pressure surface 5a of the pressure head 5 to be taken up on the takeup reel 7 rotatable on an axis approximately parallel to a rotational axis of the feed reel 2. The feed reel 2 and takeup reel 7 are operatively interconnected through an interlocking mechanism 21 provided laterally inside the case 6. As the tape 1 is fed from the feed reel 2, the base material 1b is taken up on the takeup reel 7 after the paint film 1a acting as a transfer film is transferred by the pressure head 5.

The interlocking mechanism 21 comprises a rubber belt 20 acting as a circulating endless body to function as a frictional transmission means provided between a feed-side pulley 18 rotatable with the feed reel 2 and a takeup-side pulley 19 ratable with the takeup reel 7 to circulate in frictional contact with the two pulleys 18, 19. The two pulleys 18, 19 have different diameters so that the takeup reel 7 has a takeup rate always equal to or greater than a feed rate of the tape 1 by the feed reel 2. Specifically, the feed-side pulley 18 is set to a large diameter and the takeup-side pulley 19 to a small diameter so that the takeup rate is equal to or greater than the feed rate even when the winding diameter of the tape 1 wound on the takeup reel 7 is at maximum.

Moreover, the difference between the two rates which varies every moment during use is absorbed by utilizing slippage occurring at least partly between the rubber belt 20 and the two pulleys 18, 19.

With this transfer film transfer device, the tape 1 fed from the feed reel 2 is taken up on the takeup reel 7 without relaxing after use since the feed-side pulley 18 and takeup-side pulley 19 have different diameters so that the takeup rate is always equal to or greater than the feed rate.

Since the difference between the two rates is absorbed by utilizing slippage occurring at least partly between the rubber belt 20 and the two pulleys 18, 19, the difference in rate is canceled out through the absorption utilizing the slippage although the quantity of tape 1 wound and stored on the feed reel 2 and the quantity of tape 1 wound on the takeup reel 7 vary with use.

The circulating endless body may comprise an element other than a rubber belt, such as a strap. However, a chain or other element that does not involve slippage is unacceptable.

The above embodiment is applicable to a paint film transfer device used for pasting characters and pictures and an adhesive film transfer device used for bonding paper together as well as a paint film transfer device used for picture revision.

The present invention is applicable also to a transfer film transfer device of the type in which the head contacts and transfers the transfer film after the transfer film is separated from the tape. The present invention is applicable also to a transfer film transfer device of the type in which the transfer film is heated and transferred by the head.

In the above embodiment, the drive is primary-transmitted to the feed reel. The present invention

is applicable also to a transfer film transfer device constructed such that the drive is primary-transmitted to the takeup reel to rotate the takeup reel, the torque thereof being frictionally transmitted to the feed reel through the described roller to rotate the feed reel.

A transfer film transfer device in a further embodiment will be described.

In Fig. 7, a case 6 includes a storage section 3 having a feed reel 2 holding a picture revising tape 1 wound thereon in a roll form to be fed out, the picture revising tape 1 having a white pressure sensitive transfer film 1a lightly adhering in film form to a base material 1b, and a pressure head 5 for pressing on a receiving surface 4 the pressure sensitive transfer film 1a of the tape 1 fed from the storage section 3 and transferring the transfer film 1a to the receiving surface 4.

The tape 1 runs from the feed reel 2 past the pressure head 5 to be taken up on the takeup reel 7 rotatable on an axis approximately parallel to a rotational axis of the feed reel 2. The feed reel 2 and takeup reel 7 are operatively interconnected through an interlocking mechanism 21 provided laterally inside the case 6. As the tape 1 is fed from the feed reel 2, the base material 1b is taken up on the takeup reel 7 after the transfer film 1a is transferred by the pressure head 5.

The interlocking mechanism 21 comprises a rubber transmission belt 20 wound around a large diameter pulley 18 fixed to the feed reel 2 and a small diameter pulley 19 fixed to the takeup reel 7. The takeup reel 7 has a higher rotational rate than the feed reel 2 so that the takeup rate of the takeup reel 7 always exceeds the feed rate of the feed reel 2 in spite of variations in the winding diameters of the tape 1 on the reels 2, 7. The difference between the takeup rate of the takeup reel 7 and the feed rate of the feed reel 2 is absorbed by slippage occurring between the transmission belt 20 and the pulleys 18, 19, to positively take up the tape 1 on the takeup reel 7 while avoiding an excessive tension acting on the tape 1.

The tape 1 has a resin or paper base material 1b with a release layer formed of silicone resin or the like, and a transfer film 1a including a pigment, a binding agent, a dispersing agent and the like and lightly adhering thereto through the release layer. The transfer film 1a has an adhesive layer formed thereon for adhesion to the receiving surface 4.

The pressure head 5 has an approximately triangular construction, as seen in side view, including a facial press portion 5a for facial contact with the transfer film 1a and pressing it on the receiving surface 4, and a linear press portion 5b for linear contact in a transverse direction with the transfer film 1a pressed on the receiving surface 4 and pressing it on the receiving surface 4.

The pressure head 5 is attached to the case 6 to be rotatable on a transverse axis X, and a spring S is provided to act as urging means for urging the linear press portion 5b to a position to press the transfer film 1a on the receiving surface 4. The pressure head 5 is switchable between a first position in which the facial press portion 5a presses the transfer film 1a on the receiving surface 4, to which the pressure head 5 is rotatable counterclockwise against the urging force of the spring S by pressing the pressure head 5 against the receiving surface 4, and a second position in which the linear press portion 5b presses the transfer film 1a, to which the pressure head 5 is rotatable clockwise under the urging force of the spring S.

A method of using the transfer film transfer device in this embodiment will be described next with reference to Figs. 9 (a), (b), (c).

As shown in Fig. 9 (a), the case 6 is held in a hand and the pressure head 5 is pressed on the receiving surface 4 to switch the pressure head 5 to the first position. Thereafter the case 6 is moved to cause the transfer film 1a to adhere through the adhesive layer (not shown) to the receiving surface 4 over a desired range.

Next, when the case 6 is lifted from the receiving surface 4, as shown in Fig. 9 (b), the pressure head 5 is switched to the second position under the urging force of the spring S. At this time, the linear press portion 5b presses on the receiving surface 4 a downstream end of the adhering transfer film with respect to a direction of movement of the pressure head. Thus, the adhering terminal end of the transfer film 1a is positively separable along the straight linear press portion 5b. As shown in Fig. 9 (c), the transfer film 1a may be transferred with the terminal end in a substantially fixed linear shape.

In the condition in which the pressure head 5 is switched to the second position (see Fig. 9 (b)) under the urging force of the spring S after the pressure head 5 causes the transfer film 1a to adhere to the receiving surface 4, the case 6 may be pressed downwardly to positively cut the adhesion terminal end of the transfer film 1a with the linear press portion 5b.

Numeral 29 in Fig. 7 and Fig. 8 is a stopper for limiting rotation of the pressure head 5. A further clockwise rotation from the second position shown in Fig. 8 is prevented by contact with the stopper 29.

In the above embodiment, the facial contact portion 5a and linear contact portion 5b of the pressure head 5 are formed integrally, but may be formed separately.

In the above embodiment, the linear press portion 5b is urged by the spring S to the position to

press the transfer film 1a on the receiving surface 4. However, as shown in Figs. 10 (a), (b), the facial press portion 5a of the pressure head 5 may be formed of an elastically deformable elastic material, with the linear press portion 5b formed of a hard material such as a metal or a hard plastic and attached to a tip end of the facial press portion 5a. By pressing the pressure head 5 on the receiving surface 4, the facial press portion 5a is elastically deformable to the position to press the transfer film 1a in facial contact on the receiving surface 4.

The above embodiment uses the tape 1 having the transfer film 1a adhering to the base material 1b. Where the transfer film 1a itself has a sufficient tensile strength, the transfer film 1a may comprise only the transfer film 1a without the base material 1b.

A transfer film transfer device in a further embodiment will be described.

Fig. 11 shows a transfer tape holder having a feed reel 2 and a takeup reel 7 rotatably supported in a case 6 integral with a pressure head 1 having a pressure surface 5a acting as a transfer section. A transfer tape 1 comprising a transferable pressure sensitive transfer layer 1a formed under pressure on one face of a base material 1b is rotatably supported such that the transfer material 1 is wound in a pancake form on the feed reel 2 with an adhesion face directed radially inwardly. A pay-out portion P is formed which pays out the transfer tape 1 with rotation of the transfer material 1. The transfer tape 1 paid out of the pay-out portion P is wound through a guide 39 onto the pressure surface of the pressure head 5, and further wound on the takeup reel 7 to be taken up on the peripheral surface of the takeup reel 7 with rotation thereof.

A supported portion 7b acting as a rotary shaft of the takeup reel 7 is supported to be movable toward a rotational axis X of the feed reel 2 along slots 7c formed to extend through inner and outer surfaces of the case 6.

As shown in Fig. 12, compression springs are provided which comprise thin plate members 7d formed integral with the case 6 to project to inside faces of the slots 7c and elastically deformed into a boomerang shape in a direction of a plane including the axis of the rotary shaft 7b. These compression springs 7d constitute a pressure contact mechanism 100 for urging the rotary shaft 7b and providing a pressure contact between an outer periphery of the pancake-like transfer material 1 and an outer periphery of the transfer tape 1 taken up on the takeup reel 7.

Rotation of the pancake-like transfer material 1 and rotation of the takeup reel 7 are interlocked through the pressure contact provided by the pressure contact mechanism 100. By moving the entire case in the direction of an arrow, with the transfer film 5b pressed on the receiving surface 4, the transfer film 5b is transferred over the full force to the receiving surface 4, the transfer tape 1 is paid out of the pay-out portion P, and at the same time the takeup reel 7 is rotated to take up the base material 1b.

A tension is applied to the transfer tape 1 in a running path between the pressure head 5 and takeup reel 7 in order to prevent sagging even when a pay-out rate of the transfer tape 1 is slightly higher than its takeup rate.

As shown in Fig. 13, the tension is applied by an oscillatable rod member 6h in an L-shaped form having an oscillatable arm 6e projecting into a perforation 6c formed in the case and a pressure member 6d projecting toward an inner face of the case, which are formed integral with the case 6, the arm being elastically deformed to place the pressure member 6d in contact with the transfer tape 1.

Fig. 19 shows the case 6 in this embodiment with the feed reel 2 and takeup reel 7 not assembled. In this state, the thin plate members 7d to act as the compression springs and the oscillatable arm 6e for applying the tension are integral with the case 6 without being elastically deformed.

Fig. 14 and Fig. 15 show compression springs in a different embodiment for pressing the rotary shaft 7b of the takeup reel 7 toward the rotational axis X of the feed reel 2. The compression springs comprise thin plate members 7d formed integral with the case 6 in a cantilever fashion to extend along the slots 7c, and elastically deformed in the direction of a plane perpendicular to the axis of the rotary shaft 7b.

Other arrangements are the same as in the above embodiment.

Fig. 16 and Fig. 17 show a pressure contact mechanism 100 in a different embodiment for providing a pressure contact between an outer periphery of the pancake-like transfer material 1 and an outer periphery of the transfer tape 1 taken up on the takeup reel 7. The case 6 defines bores 6g continuous with the slots 7c for supporting the rotary shaft 7b. Thin plate members 6f are formed integral with the case 6 to project in a cantilever fashion along the bores 6g. The thin plate members 6f are elastically deformed along the direction of movement of the rotary shaft 7b to contact the rotary shaft 7b, thereby to urge and press the takeup reel 7.

Other arrangements are the same as in the above embodiment.

Fig. 18 shows an embodiment in which the pancake-like transfer material 1 is mounted on the feed reel 2, with the transfer tape 1 wound in a pancake form having the adhesion face thereof directed radially outwardly.

Other arrangements are the same as in the

above embodiment.

The pressure contact mechanism may be modified such that the feed reel has a movably supported rotary shaft and the feed reel is urged and pressed.

The transfer tape after passing through the transfer portion may be taken up on the takeup reel while being caused to adhere lightly, to prevent the transfer tapes from slipping relative to each other when the takeup reel is rotated.

The transfer portion is not limited to the type that causes the transfer layer formed on the base material to be transferred throughout its entire width to the receiving surface.

The transfer film is not limited to the pressure sensitive transfer film but may be a pressure sensitive thermal transfer film or adhesive paste.

In the case of a heat sensitive transfer film, a heating element may be provided on the pressure surface of the transfer section.

The pressure contact mechanism may be constructed such that the takeup reel is formed of an elastic material such as rubber, with the rotary shaft thereof supported at a fixed position, to secure a pressure contact by means of elastic deformation of the takeup reel.

A transfer film transfer device in a further embodiment will be described hereinafter.

Fig. 20 shows a paint film transfer device comprising a case 6 including a storage section 3 having a feed reel 2 holding a picture revising tape 1 wound thereon in a roll form to be fed out, the picture revising tape 1 having a white pressure sensitive transfer film 1a lightly adhering in film form to a base material 1b, and a pressure head 5 for pressing on a receiving surface 4 the pressure sensitive transfer film 1a of the tape 1 fed from the storage section 3 and transferring the transfer film 1a to the receiving surface 4.

The tape 1 runs from the feed reel 2 past a pressure surface 5a of the pressure head 5 to be taken up on the takeup reel 7 rotatable on an axis approximately parallel to a rotational axis of the feed reel 2. The feed reel 2 and takeup reel 7 are operatively interconnected through an interlocking mechanism 21 provided laterally inside the case 6. As the tape 1 is fed from the feed reel 2, the base material 1b is taken up on the takeup reel 7 after the paint film 1a is transferred by the pressure head 5.

As in Fig. 4, the interlocking mechanism 21 comprises a rubber transmission belt 20 wound around a large diameter pulley 18 fixed to the feed reel 2 and a small diameter pulley 19 fixed to the takeup reel 7. The takeup reel 7 has a higher rotational rate than the feed reel 2 so that the takeup rate of the takeup reel 7 always exceeds the feed rate of the feed reel 2 in spite of variations in the winding diameters of the tape 1 on the reels 2, 7. The difference between the takeup rate of the takeup reel 7 and the feed rate of the feed reel 2 is absorbed by slippage occurring between the transmission belt 20 and the pulleys 18, 19, to positively take up the tape 1 on the takeup reel 7 while avoiding an excessive tension acting on the tape 1.

The pressure head 5 includes a linear edge 49 formed downstream of the pressure surface 5a with respect to the running direction of the pressure head and extending transversely of the tape. The pressing surface 5a and an imaginary plane T including the linear edge 48 and contacting a peripheral surface 6i of the case 6 cross each other with the case 6 in between.

The tape 1 has a resin or paper base material 1b with a release layer formed of silicone resin or the like, and a paint film 1a including a pigment, a binding agent, a dispersing agent and the like and lightly adhering thereto through the release layer. The paint film 1a has an adhesive layer formed thereon for adhesion to the receiving surface 4.

A method of using the paint film transfer device in this embodiment will be described next with reference to Figs. 21 (a) through (d).

As shown in Fig. 21 (a), the case 6 is held in a hand and the edge 49 of the pressure head 5 is fixed to an end of a desired range of the receiving surface 4.

Next, as shown in Fig. 21 (b), the case 6 is swung on the edge 49 downstream with respect to the direction of tape feed, to place the pressure surface 5a of the pressure head 5 along the receiving surface 4. Thereafter, the pressure head 5 is run upstream with respect to the direction of tape feed while pressing the transfer film or paint film 1a on the receiving surface 4. At this time, the paint film 1a is transferred to the receiving surface 4 through the adhesive layer, and the tape 1 is forcibly fed from the feed reel 2. At the same time, the base material 1b separated from the paint film 1a is taken up on the takeup reel 7.

Next, as shown in Fig. 21 (c), at a transfer ending position the case 6 is swung on the edge 49 upstream with respect to the direction of tape feed, to press hard a transfer terminal end of the paint film 1a with the edge to secure a sufficient adhesion of the paint film 1a to the receiving surface 4 along the width of the edge 49.

When the case 6 is lifted from the receiving surface 4, as shown in Fig. 21 (d), the transfer terminal end of the paint film 1a is cut in a substantially fixed linear shape.

Where the pressure sensitive transfer paint film itself has a sufficient tensile strength, the tape may comprise only the pressure sensitive transfer paint film without the base material.

A transfer film transfer device in a further em-

bodiment will be described hereinafter.

Fig. 22 shows a transfer film transfer device comprising a case 6 including a storage section 3 having a feed reel 2 holding a picture revising tape 1 wound thereon in a roll form to be fed out, the picture revising tape 1 having a white pressure sensitive transfer film 1a lightly adhering in film form to a base material 1b, and a pressure head 5 integral with the case 6 and including a scraper 5c pressed on the paint film 1a of the tape 1 fed from the storage section 3 for separating the paint film 1a from the base material 1b, and a pressing surface 5a for pressing on and transferring to a receiving surface 4 the paint film 1a separated by the scraper 5c.

A roller 27 is supported behind the pressure surface 5a of the head 5. The tape 1 runs from the feed reel 2 around the roller 27, with an end thereof fixed to a takeup reel 7. As shown in Fig. 23, the roller 27 is urged by plate springs 27a to press the scraper 5c.

As shown in Fig. 22 and Fig. 24, the feed reel 2 has main bodies 2a in the form of a pair of left and right rotatable wheels with peripheral surfaces 2d covered by anti-slip rubber and projecting outwardly of the case 6, so that the feed reel 2 is rotatable by rolling on the receiving surface 4. The feed reel 2 and takeup reel 7 are operatively interconnected through a rubber transmission belt 20 wound around a large diameter pulley 18 fixed to the feed reel 2 and a small diameter pulley 19 fixed to the takeup reel 7. Thus, a running means R is formed such that the case 6 is held in a hand and moved with the peripheral surfaces 2d of the rotatable wheels 2a placed in contact with and rolled along the receiving surface 4. Consequently, the tape 1 is fed from the feed reel 2, and at the same time the base material 1b after being used in transfer is run along a fixed path while being taken up.

Because of the relationship in size between the pulleys 18, 19, the takeup reel 7 has a higher rotational rate than the feed reel 2 so that the takeup rate of the takeup reel 7 always exceeds the feed rate of the feed reel 2 in spite of variations in the winding diameters of the tape 1 on the reels 2, 7. The difference between the takeup rate of the takeup reel 7 and the feed rate of the feed reel 2 is absorbed by slippage occurring between the transmission belt 20 and the pulleys 18, 19, to positively take up the tape 1 on the takeup reel 7 while avoiding an excessive tension acting on the tape 1.

A transfer mechanism for the paint film 1a will be described next.

The tape 1 is run by the action of the running means R when the device is moved rightward in Fig. 22 with the pressure surface 5a of the head 5 and the peripheral surfaces 2d of the rotatable wheels 2a contacting the receiving surface 4.

The tape has the base material 1b taken up on the takeup reel 7 while running as supported between the scraper 5c and roller 27. The paint film 1a is separated from the base material 1b by the scraper 5c, and pressed by the pressure surface 5a to be transferred to the receiving surface 4.

Where the paint film 1a has a small tensile strength, it is desirable that a separation starting position of the scraper 5c and a press starting position of the pressure surface 5a are as close to each other as possible.

The tape 1 has a resin or paper base material 1b with a release layer formed of silicone resin or the like, and a paint film 1a including a pigment, a binding agent, a dispersing agent and the like and adhering thereto through the release layer. The paint film 1a has an adhesive layer formed thereon for adhesion to the receiving surface 4.

The paint film transfer device according to the present invention presses only the paint film separated from the base material on the receiving surface. Therefore, not only is the paint film once caused to adhere to the receiving surface easily separable, the paint film 1a is flexed, though slightly, when the paint film 1a is separated by the scraper 5c. The paint film 1a in a thin film form has a film holding strength lowered by a shear force due to the flexion. A paint film portion adhering to the receiving surface and a paint film portion not adhering to the receiving surface are positively separated by a pressing edge of the transfer surface 5a. The transfer is completed in an excellent form without the transfer terminal end of the paint film 1a formed unevenly.

The scraper 5c and pressure surface 5a of the head 5 are surfacially coated with a known fluororesin not adhesive to the paint film 1a.

Fig. 25 shows an embodiment in which the scraper 5c and pressure surface 5a are formed separately. The case 6 supports a pressure roller 37 defining a pressure surface 5a peripherally thereof. The paint film 1a separated from the base material 1b by the scraper 5c is wound on the pressure roller 37 and guided to the receiving surface 4, and is pressed and transferred by the peripheral surface of the pressure roller 37.

The case 6 includes a cutter 31 formed integral therewith forwardly of the pressure roller 37 to be elastically deformable toward and away from the peripheral surface of the pressure roller 37. The case 6 is tilted at a transfer ending position to press the cutter 31 against the receiving surface 4 for elastic deformation toward the pressure roller 37, thereby to cut the paint film 1a with a blade portion 31a thereof. Consequently, the paint film 1a has a transfer terminal end in a linear shape approximately perpendicular to the width of the tape.

According to this embodiment, the transfer is carried out by moving the case 6 leftward in Fig. 25. Therefore, the winding direction of the tape 1 with respect to the reels 2, 7 may be reversed from the embodiment shown in Fig. 22, the tape 1 being wound on the feed reel 2 to have the paint film 1a facing the reel axis.

Where a tape having a heat sensitive transfer film formed on a base material is used, the paint film transfer device may have the head 5 or pressure roller 37 in the embodiments formed of a heat resisting material and a heating element provided on the pressing surface 5a.

A transfer film transfer device in a further embodiment will be described hereinafter.

Fig. 27 shows a paint film transfer device comprising a case 6 including a storage section 3 having a feed reel 2 holding a picture revising tape 1 wound thereon in a roll form to be fed out, the picture revising tape 1 having a white pressure sensitive transfer film 1a lightly adhering in film form to a base material 1b, and a pressure head 5 for pressing on a receiving surface 4 the paint film 1a of the tape 1 fed from the storage section 3.

The tape 1 runs from the feed reel 2 past a pressure surface 5a of the pressure head 5 to be taken up on the takeup reel 7 rotatable on an axis approximately parallel to a rotational axis of the feed reel 2. The feed reel 2 and takeup reel 7 are operatively interconnected through an interlocking mechanism 21 provided laterally inside the case 6. As the tape 1 is fed from the feed reel 2, the base material 1b is taken up on the takeup reel 7 after the paint film 1a is transferred by the pressure head 5.

The interlocking mechanism 21 comprises a rubber transmission belt 20 wound around a large diameter pulley 18 fixed to the feed reel 2 and a small diameter pulley 19 fixed to the takeup reel 7. The takeup reel 7 has a higher rotational rate than the feed reel 2 so that the takeup rate of the takeup reel 7 always exceeds the feed rate of the feed reel 2 in spite of variations in the winding diameters of the tape 1 on the reels 2, 7. The difference between the takeup rate of the takeup reel 7 and the feed rate of the feed reel 2 is absorbed by slippage occurring between the transmission belt 20 and the pulleys 18, 19, to positively take up the tape 1 on the takeup reel 7 while avoiding an excessive tension acting on the tape 1.

The pressure head 5 includes a linear edge 49 formed downstream of the pressure surface 5a with respect to the running direction of the pressure head and extending transversely of the tape. The pressing surface 5a and an imaginary plane T including the linear edge 48 and contacting a peripheral surface 6i of the case 6 cross each other with the case 6 therebetween.

As shown in Fig. 26, the pressure head 5 includes a stationary head A fixed to the case 6, and retractable heads B, C slidable relative to the case 6. The retractable heads B, C may be moved inwardly or outwardly as appropriate to place pressure surfaces B1, C1 thereof flush with a pressure surface A1 of the stationary head A, to vary a pressing width of the pressure head 5 relative to the paint film 1a transversely of the tape.

To describe a retracting structure for the retractable heads B, C, through holes B2, C2 elongated in the direction of projection and retraction are formed in the retractable heads B, C, and springs B3, C3 are mounted between inner surfaces of the through holes B2, C2 and proximal ends of engaging pieces A2, A3 integral with the stationary head A for urging the retractable heads B, C so that the pressure surfaces B1, C1 are retracted inwardly of the case 6, the retracted positions being maintained through contacts between the case 6 and tops B5, C5 of the retractable heads B, C exposed to outer surfaces of the case 6.

When the heads B5, C5 of the retractable heads B, C are pressed against the force of the springs B3, C3, engaging portions B4, C4 integral with the retractable heads B, C descend while elastically deforming the engaging pieces A2, A3. The pressure surfaces B1, C1 are maintained, by contacts between the engaging portions B4, C4 and engaging pieces A2, A3, in projecting positions approximately flush with the pressure surface A1 of the stationary head A.

Next, for reducing the pressing width, one or both of the retractable heads B, C is/are retracted. When control portions A4, A5 of the engaging pieces A2, A3 are pressed toward the stationary head A, the contacts between the engaging portions B4, C4 and engaging pieces A2, A3 are broken, whereby the retractable heads B, C are switched to the retracted position under the forces of the spring B3, C3.

A different embodiment will be described.

Fig. 28 and Fig. 29 show a pressure head 5 in a different embodiment, in which the pressure head 5 defines three types of pressure surfaces 5a having different pressing widths and out of phase with each other peripherally thereof, and is securely fitted on elastically deformable support plates 6j, 6k integral with the case 6. By selecting a fitting position of the pressure head 5 relative to the support plates 6j, 6k, the pressure surfaces 15a for contacting the tape 1 are changeable to vary the pressing width for the paint film 1a transversely of the tape.

The pressure head 5 has a rotary shaft member 5d formed integral with one end thereof, and a stepped shaft member 5f formed integral with the

other end thereof and including a rotary shaft portion 5g and a different diameter shaft portion 5e. One of the support plates 6j, 6k defines a fitting bore 6m for rotatably receiving the rotary shaft member 5d, and the other defines a fitting bore 6o including a rotary shaft receiving portion 6p for receiving the rotary shaft portion 5g of the stepped shaft member 5f and a different diameter shaft receiving portion 6n for receiving the different diameter shaft portion 5e.

For changing the pressure surfaces 5a to vary the pressing width, one or both of the support plates 6j, 6k is/are elastically deformed to disengage the different diameter shaft portion 5e and the different diameter shaft receiving portion 6n. Then the pressure head 5 is rotated to project a pressure surface 5a having a desired pressing width out of the case 6, which is locked by reengaging the different diameter shaft portion 5e and the different diameter shaft receiving portion 6n.

A further embodiment will be described hereinafter.

Fig. 30 shows a heating head 41 for transferring a heated portion of a paint film 1a to a receiving surface 4. This heating head 41 has a flexible construction having a metallic foil 41b acting as a heating material applied to a heat resistant resin sheet 41a such as polyester resin acting as a reinforcing material and having a heat resisting temperature on the order of 100° C to 200° C. One end thereof is fixed to the case 6 and connected to a heating circuit (not shown), and the other end is pulled inwardly of the case 6 by a spring 41c. An intermediate portion thereof is in contact with a support member 41d movable and fixable transversely of the tape. A metallic foil portion between a position fixed to the case 6 and a position contacting the support member 41d contacts the tape 1 to heat the paint film.

The support member 41d is movable transversely of the tape by pushing and pulling at a control portion 41e, to vary a heating width for the paint film 1a transversely of the tape.

The heating material may be formed by vapor deposition of a metal on the sheet 41a.

A pressure or heating head may include a plurality of removable contact members, so that the pressing or heating width for the paint film transversely of the tape is variable by suitably mounting or removing the contact members.

A pressure or heating head may include a plurality of oscillatable contact members, so that the pressing or heating width for the paint film transversely of the tape is variable by suitably oscillating the contact members away from contact positions.

For transferring the paint film to the receiving surface by heating, the pressure head in the foregoing embodiments may include a heating element.

A transfer film transfer device in a further embodiment will be described hereinafter.

Fig. 31 shows a paint film transfer device comprising a case 6 including a storage section 3 having a feed reel 2 holding a picture revising tape 1 wound thereon in a roll form to be fed out, the picture revising tape 1 having a white pressure sensitive transfer film 1a lightly adhering in film form to a base material 1b, and a head 5 provided on the case 6 and acting as a transfer section for heating and softening or fusing the heat sensitive transfer paint film 1a of the tape 1 fed from the storage section 3.

The tape 1 runs from the feed reel 2 and wound on a rotating roller 27, with an end thereof fixed to a takeup reel 7.

As shown in Fig. 31 and Fig. 33, the feed reel 2 has main bodies 2a in the form of a pair of left and right rotatable wheels with peripheral surfaces 2d covered by anti-slip rubber and projecting outwardly of the case 6, so that the feed reel 2 is rotatable by rolling on the receiving surface 4. The feed reel 2 and takeup reel 7 are operatively interconnected through a rubber transmission belt 20 wound around a large diameter pulley 18 fixed to the feed reel 2 and a small diameter pulley 19 fixed to the takeup reel 7. Thus, a running means R is formed such that the case 6 is held in a hand and moved with the peripheral surfaces 2d of the rotatable wheels 2a placed in contact with and rolled along the receiving surface 4. Consequently, the tape 1 is fed from the feed reel 2, and at the same time the base material 1b after being used in transfer is run along a fixed path while being taken up.

Because of the relationship in size between the pulleys 18, 19, the takeup reel 7 has a higher rotational rate than the feed reel 2 so that the takeup rate of the takeup reel 7 always exceeds the feed rate of the feed reel 2 in spite of variations in the winding diameters of the tape 1 on the reels 2, 7. The difference between the takeup rate of the takeup reel 7 and the feed rate of the feed reel 2 is absorbed by slippage occurring between the transmission belt 20 and the pulleys 18, 19, to positively take up the tape 1 on the takeup reel 7 while avoiding an excessive tension acting on the tape 1.

The transfer section 5 includes the rotating roller 27 on which the tape 1 is wound, and a heating roller 45 rotatable with a peripheral surface 45a contacting the paint film 1a of the tape wound on the rotating roller 27.

The heating roller 45 has an electric heating element mounted on the peripheral surface 45a, and is supported to be movable between a sand-

wiching position, as shown in Fig. 32, to sandwich the tape 1 with the rotating roller 27 and a releasing position for canceling the sandwich, which is normally maintained in the releasing position by plate springs 5d.

Electrification of the heating element is started when the heating roller 45 is placed in contact with the receiving surface 4 and moved to the sandwiching position against the urging force of the plate springs 45c.

A transfer mechanism for the paint film 1a will be described next.

When the heating roller 45 is placed in contact with and pressed on the receiving surface 4, the heating roller 45 moves to the sandwiching position and electrification of the heating element is started.

When, in this state, the rotatable wheels 2a are placed in contact with the receiving surface 4 and moved leftward in Fig. 31, the tape 1 runs by the action of the running means R.

At this time, the peripheral surface 45a of the heating roller 45 contacts the paint film 1a and rotates while heating and softening or fusing the paint film 1a. The softened or fused paint film 1a is transferred from the base material 1b to the peripheral surface 45a and retained thereon in the softened or fused state.

At the same time, with rotation of the heating roller 45, the paint film 1a held on the peripheral surface 45a successively contacts the receiving surface 4 to be cooled, thereby adhering and being transferred to the receiving surface 4.

The tape 1 has the heat sensitive transfer paint film 1a adhering in a film form to a resin or paper base material 1b. The paint film 1a is caused to adhere to the receiving surface 4 with a thermoplastic resin such as ethylene-vinyl acetate copolymer being heated and softened or fused.

A power source for the heating element may comprise a battery mounted in the case 6 or an external source may be used therefor.

A further embodiment will be described hereinafter with reference to the drawings.

Fig. 34 shows an adhesive applying device comprising a case 6 including a storage section 3 having a feed reel 2 holding a tape 1 wound thereon in a roll form to be fed out, and a head 5 acting as an applying, heating and pressing section for heating and pressing a heat sensitive type adhesive layer 1a, acting as a transfer film, of the tape 1 fed from the storage section 3 for application to a transfer-receiving or application-receiving surface 4. The tape has a base material 1b with the heat sensitive type adhesive layer 1a including wax, plasticizer, tackifier, antioxidant, filler and the like added to a base polymer such as ethylene-vinyl acetate copolymer, ethylene-acrylic ester copolymer, polyamide, polyester, polycarbonate, cellulose derivative, polyvinyl acetal, phenoxy resin or the like.

The tape 1 runs from the feed reel 2 past a heating and pressing surface 5a of the pressure head 5 to be taken up on a takeup reel 7 rotatable on an axis approximately parallel to a rotational axis of the feed reel 2. The feed reel 2 and takeup reel 7 are operatively interconnected through an interlocking mechanism 21 provided laterally inside the case 6. As the tape 1 is fed from the feed reel 2, the adhesive layer 1a is supplied to the heating and pressing surface 5a of the head 5, and at the same time the base material 1b is taken up on the takeup reel 7 after the adhesive layer 1a is transferred. This construction provides a feed mechanism K.

The interlocking mechanism 21 comprises a rubber transmission belt 20 wound around a large diameter reel 2a fixed to the feed reel 2 and a large diameter pulley 19 fixed to the takeup reel 7. The takeup reel 7 has a higher rotational rate than the feed reel 2 so that the takeup rate of the takeup reel 7 always exceeds the feed rate of the feed reel 2 in spite of variations in the winding diameters of the tape 1 on the reels 2, 7. The difference between the takeup rate of the takeup reel 7 and the feed rate of the feed reel 2 is absorbed by slippage occurring between the transmission belt 20 and the pulleys 2a, 19, to positively take up the tape 1 on the takeup reel 7 while avoiding an excessive tension acting on the tape 1.

As shown in Fig. 35, a ratchet wheel 110a is provided on a side of the small diameter pulley 19 opposed to an inner surface of the case 6. The case 6 has a ratchet pawl 110b fixed thereto for engaging the ratchet wheel 110a. These constitute a ratchet mechanism 110 for preventing backward rotation of the takeup reel 7 when the tape is pulled toward the feed reel 2, thereby avoiding the base material 1b one taken up on the takeup reel 7 being paid out. As described later, the head 5 is used also as a bonding heating and pressing means.

An electric heating element is mounted on the heating and pressing surface 5a of the head 5. When a switch SW1 is depressed with a finger, the heating element is electrified by a battery mounted in the case 6. The heating element may be connected to an external source to be electrified by operating the switch SW1.

A method of using the adhesive applying device in this embodiment will be described next with reference to Figs. 36 (a), (b).

As shown in Fig. 36 (a), the case 6 is held in a hand and an edge 32 of the head 5 is pressed on one end of a desired adhesion range of the receiving surface 4 which is one of the adhesive-receiving surfaces. When the device is moved in this

state in the direction of an arrow with the switch SW1 depressed, the feed mechanism K forcibly feeds the tape 1 from the feed reel 2, with the adhesive layer 1a supplied to the heating and pressing surface 5a, whereby the adhesive layer 1a is softened or fused and applied to the receiving surface 4. At this time, the base material 1b after the adhesive layer 1a is applied is taken up on the takeup reel 7.

Next, as shown in Fig. 36 (b), a thin receiving material such as a thin sheet of paper acting as the other adhesive-receiving surface is placed on the adhesive layer 1a already applied, and the heating and pressing surface 5a of the head 5 is pressed thereon. When the device is moved in this state in the direction opposite to the direction in which the adhesive layer 1a is applied, with the switch SW1 depressed, the already applied adhesive layer 1a is softened or fused again between the receiving surfaces 4, 4a, without a further supply of the adhesive layer 1a , whereby the two receiving surfaces 4, 4a are bonded together through the adhesive layer 1a.

Thus, the heating and pressing member 5 for application is used also as a heating and pressing means for bonding purposes.

In this case, the ratchet mechanism 110 is operative to eliminate the possibility of the base material 1b taken up on the takeup reel 7 being forcible paid out.

Fig. 37 shows a construction which dispenses with the ratchet mechanism 110 provided in the above embodiment for preventing backward rotation of the takeup reel 7, and includes a heating trowel 51 mounted on the case 6 to act as a heating and pressing means for bonding in addition to the head 5. When bonding the receiving surfaces 4, 4a by heating and pressing the already applied adhesive layer 1a without applying the adhesive layer 1a to the receiving surface 4, a switch SW2 is depressed to electrify the heating trowel 51, and this heating trowel 51 is used for the heating and pressing.

Fig. 38 through Fig. 40 show a still further embodiment. As shown in Fig. 38 and Fig. 40, the feed reel 2 has main bodies 2a in the form of a pair of left and right rotatable wheels with peripheral surfaces 2d covered by anti-slip rubber and projecting outwardly of the case 6, so that the feed reel 2 is rotatable by rolling on the receiving surface 4. The feed reel 2 and takeup reel 7 are operatively interconnected through a rubber transmission belt 20 wound around a large diameter pulley 18 fixed to the feed reel 2 and a small diameter pulley 19 fixed to the takeup reel 7. Thus, a feed mechanism K is formed such that the case 6 is held in a hand and moved with the peripheral surfaces 2d of the rotatable wheels 2a placed in contact with and rolled along the receiving surface 4. Consequently, the tape 1 is fed from the feed reel 2 with the adhesive layer 1a supplied to the heating and pressing surface 5a, and at the same time the base material 1b after the adhesive layer 1a is applied is run along a fixed path while being taken up.

The case 6 includes a rotating roller 27 on which the tape 1 is wound, and a heating roller 45 acting as a heating and pressing member for application purposes which is rotatable with a peripheral surface 45a contacting the adhesive layer 1a of the tape wound on the rotating roller 27. The heating roller 45 has an electric heating element mounted on the peripheral surface 45a acting as a heating and pressing surface, and is supported to be movable between a sandwiching position, as shown in Fig. 39, to sandwich the tape 1 with the rotating roller 27 and a releasing position for canceling the sandwich, which is normally maintained in the releasing position by plate springs 5d.

Electrification of the heating element is started when the heating roller 45 is placed in contact with the receiving surface 4 and moved to the sandwiching position against the urging force of the plate springs 45c.

When the heating roller 45 is placed in contact with and pressed on the receiving surface 4, the heating roller 45 moves to the sandwiching position and electrification of the heating element is started. When, in this state, the rotatable wheels 2a are placed in contact with the receiving surface 4 and moved leftward in Fig. 38, the tape 1 runs by the action of the feed mechanism K.

At this time, the peripheral surface 45a of the heating roller 45 contacts the adhesive layer 1a and rotates while heating and softening or fusing the adhesive layer 1a. The softened or fused adhesive layer 1a is transferred from the base material 1b to the peripheral surface 45a and retained thereon in the softened or fused state.

At the same time, with rotation of the heating roller 45, the adhesive layer 1a held on the peripheral surface 45a is successively pressed on the receiving surface 4 to be applied thereto.

When a thin receiving material such as paper acting as the other adhesive-receiving surface 4a is placed on the adhesive layer 1a applied to the receiving surface 4, and the adhesive layer 1a is softened or fused again from above to bond the two receiving surfaces 4, 4a together, the switch SW2 depressed, as in the foregoing embodiment, to electrify the separately provided heating trowel 51 acting as the heating and pressing means for bonding purposes, and this heating trowel 51 is used for the heating and pressing to achieve bonding.

The adhesive applying device according to the present invention may be used, after applying the

heat sensitive type adhesive layer to a thin adhesive-receiving material such as paper, to adhere this adhesive-receiving material to a selected location.

A transfer film transfer device in a further embodiment will be described.

Fig. 41 shows a revising coat film transfer device for erasing characters or pictures formed on a receiving surface 4 such as recording paper, a display plate or the like. This device has a plastic case 6 which may be held in one hand and include a coating transfer device E for transferring a coating material in a film form to the receiving surface 4, and a film removing device H for removing the coating film transferred to the receiving surface 4.

The coating transfer device E includes, as main components thereof, a tape 1 having white pressure sensitive transfer ink 1a, which is one example of coating materials, lightly adhering in a layer to one face of a base material 1b in film form, a feed reel 2 on which an unused portion of the tape 1 is wound in a roll, a takeup reel 7 for taking up a used portion of the tape 1 in a roll, a pressure head 5 for pressing the pressure sensitive transfer ink 1a of the tape 1 to the receiving surface 4, and a plurality of tape guides 36 for guiding the tape 1 fed from the feed reel 2 to run through the front of a pressure surface 5a of the pressure head 5 to the takeup reel 7.

The feed reel 2 and takeup reel 7 are mounted in the case 6 to be rotatable on axes parallel to each other. The pressure head 5 is mounted in the case 6 as exposed to an opening a defined in the bottom of the case 6.

A rubber transmission belt 20 is wound around a large diameter pulley 18 formed on the feed reel 2 and a small diameter pulley 19 formed on the takeup reel 7. The takeup reel 7 has a higher rotational rate than the feed reel 2 so that the takeup rate of the takeup reel 7 always exceeds the feed rate of the feed reel 2 in spite of variations in the winding diameters of the tape 1 on the reels 2, 7. The difference between the takeup rate of the takeup reel 7 and the feed rate of the feed reel 2 is absorbed by slippage occurring between the transmission belt 20 and the pulleys 18, 19, to positively take up the tape 1 on the takeup reel 7 while avoiding an excessive tension acting on the tape 1.

The pressure head 5 defines a linear edge 32 at an upstream end of the pressure surface 5a with respect to a direction of tape feed.

The pressure sensitive transfer ink 1a of the tape 1 includes a pigment, a binding agent, a dispersing agent and the like suitably mixed thereto. The film-like base material 1b is formed of a resin (cellophane, polyimide, polyester, polyethylene, polystyrene, polypropylene or the like) or paper (condenser paper, glassine paper, synthetic paper, laminate paper or the like) with a release layer formed of silicone resin or the like.

As shown in Fig. 42 and Fig. 43, the film removing device H includes, as main components thereof, a control member 38 vertically movable along a slit 6s defined in a side plate portion 6j of the case 6, and a thin metallic scraper 59 removably attached to the control member 38 and vertically movable along an inner surface of the side plate portion 6j with an operation of the control member 38.

The control member 38 has a screw 38a for tightening and fixing the control member 38 to a selected position within a slit-forming range of the side plate portion 6j.

The scraper 59 is switchable with a vertical operation of the control member 38 between a use position projecting outwardly through the opening a of the case 6 and a non-use position contained in the case 6.

A method of using the transfer film transfer device will be described next.

First, the case 6 is held in one hand, the edge 32 of the pressure head 5 is set to a coating transfer starting position on the receiving surface 4, and the pressure surface 5a of the pressure head 5 is pressed through the tape 1 on the receiving surface 4. In this state, as shown in Fig. 41, the pressure head 5 is moved upstream with respect to a direction of tape feed, and the pressure sensitive transfer ink 1a of the tape 1 is transferred in film form to the receiving surface 4 (The film transferred to the receiving surface 4 will be affixed with the same number as the pressure sensitive transfer ink 1a).

At this time, with the movement of the pressure head 5, the tape 1 is forcibly fed from the feed reel 2, and the film-like base material 1b after the pressure sensitive transfer ink 1a is transferred to the receiving surface 4 is taken up on the takeup reel 7 rotating with the feed reel 2.

Next, when the edge 32 of the pressure head 5 reaches a coating transfer ending position on the receiving surface 4, the case 6 is tilted on the edge 32, and the edge 32 is pressed hard at the transfer ending position of the pressure sensitive transfer ink 1a. This renders adhesion of the pressure sensitive transfer ink 1a to the receiving surface 4 at the transfer ending position sufficiently strong longitudinally of the edge 32.

By lifting the case 6 from the receiving surface 4 in this state, the pressure sensitive transfer ink 1a is linearly cut and separated at the transfer ending position.

When the pressure head 5 is caused inadvertently to overrun a transfer region in transferring the pressure sensitive transfer ink 1a, the control member 38 is operated downwardly as shown in

Fig. 43 to switch the scraper 59 from the non-use position to the use position. Then the screw 38 is tightened to fix the control member 38 to the side plate portion 6j.

And a knife edge of the scraper 59 projecting from the opening a of the case 6 is set to the unwanted pressure sensitive transfer ink film 1a transferred outside the transfer region. By moving the case 6 in this state, the unwanted pressure sensitive transfer ink film 1a may be scraped off the receiving surface 4.

In the above embodiment, the scraper 59 of the film removing device H has a flat linear configuration extending transversely of the tape. However, as shown in Fig. 44, the scraper 59 may have an arcuate shape the lowest at a mid-position transversely of the tape. When this scraper 4 is placed on the receiving surface 4, the scraper 4 may be elastically formed into a straight line transversely of the tape.

According to this embodiment, the knife edge of the scraper 59 is positively placed in tight contact with the receiving surface 4 transversely of the tape, and therefore the unwanted pressure sensitive transfer ink layer 1a transferred outside the transfer region may be scraped off with increased reliability.

Fig. 45 through Fig. 47 show a different embodiment in which the scraper 59 of the film removing device H is mounted upwardly inside the case 6.

In this embodiment, the case 6 includes guides 17, 17 formed integral with upper positions thereof at opposite sides of the scraper 59 switched to a use position, for limiting a scraping height of the scraper 59.

The scraping height h between top surfaces of the guides 17, 17 and the knife edge of the scraper 59 may suitably be set equal to or slightly greater a film thickness of the pressure sensitive transfer ink 1a transferred to the receiving surface 4.

A control member 38 for switching the scraper 49 between use position and non-use position may have an adjusting function for fine-adjusting the scraping height h of the scraper 59.

Fig. 48 and Fig. 49 show a different embodiment in which the scraper 59 of the film removing device H is formed integral with an upper portion of the case 6.

In this embodiment, a cover 40 is removably mounted on the upper portion of the case 6 for covering the scraper 59.

Fig. 50 and Fig. 51 show a different embodiment in which the scraper 59 of the film removing device H is exposed to an upper surface of the case 6.

In this embodiment, the scraper 59 has an L-shaped configuration having approximately the same size as an upper width of the case 6. The scraper 59 is pivotally connected at a proximal end thereof to an end on the upper surface of the case 6. The scraper 59 is pivotable between a non-use position contained along a contour of the case 6 and a use position projecting laterally outwardly of the case 6.

Numeral 26 in the drawings denotes magnets for attracting and holding the scraper 59 in the non-use position.

Fig. 52 and Fig. 53 show a different embodiment in which the film removing device H is constructed as an adhesion removal type.

In this embodiment, the case 6 houses, in an upper portion thereof, a tape 51 including an adhesive layer 111a formed on one face of a film-like base material 111b and having a greater adhesive strength than the pressure sensitive transfer ink 1a adhering to the receiving surface 4, a tape storage 112 including a takeup core 112a for winding in a roll and unwinding the tape 111, and a pressure head 113 for pressing the adhesive layer 111a of the tape 111 unwound and fed from the tape storage 112 on an unwanted pressure sensitive transfer ink film 1a transferred to the receiving surface 4 outside a transfer region.

A cover 114 is removably mounted on the upper portion of the case 6 for covering the pressure head 5 and the tape 111 fed from the tape storage 112. The cover 114 includes a serrated blade 115 formed integral therewith for cutting a used portion of the tape 111 between the case 6 and cover 114.

According to this embodiment, a tip end of the pressure head 113 is pressed through the tape 111 on an unwanted pressure sensitive transfer ink film 1a transferred outside a transfer region. In this state, the pressure head 113 is moved upstream with respect to a direction of tape feed to cause the adhesive layer 111a of the tape 111 to adhere to the unwanted pressure sensitive transfer ink film 1a.

Thereafter, the tape 111 is moved away from the receiving surface 4 to peel the pressure sensitive transfer ink film 1a off the receiving surface 4 onto the adhesive layer 111a of the tape 111.

The tape 111 may comprise a commercially available cellotape.

The foregoing embodiments have been described as employing the film removing device of the scrape-off type or adhesion removal type. Such removal modes are not limitative, but a removal mode by means of a sand rubber eraser or a rough surface may be employed for example.

In other words, the film removing device H may have any kind of construction only if capable of removing the coating film 1a transferred to the receiving surface 4.

The foregoing embodiments use the coating material of the pressure sensitive transfer type, but it may be the heat sensitive transfer type.

Further, the foregoing embodiments have been described in relation to the coating material comprising opaque transfer ink for erasing characters or pictures formed on the receiving surface 4. However, the coating material may be a transparent adhesive for pasting.

Still further, the foregoing embodiments use the transfer ink 1a formed in a layer on the tape-like base material 1b. However, the transfer ink 1a itself may be formed in a film, or liquid ink may be applied.

In other words, the coating transfer device E may have any kind of construction only if capable of transferring the coating material 1a in film form to the receiving surface 4.

A transfer film transfer device in a further embodiment will be described hereinafter.

Fig. 54 and Fig. 55 show a revising coat film transfer device for erasing characters or pictures formed on a receiving surface 4 such as recording paper, a display plate or the like. This device has a plastic case 6 which may be held in one hand and include a coating transfer device E for transferring a coating material 1a in a film form to the receiving surface 4, a brush-like film removing member 58 rotatable for removing the coating film 1a transferred to the receiving surface 4, and a torque applying device L manually operable for applying torque to the film removing member 58.

The coating transfer device E includes, as main components thereof, a tape 2 having white pressure sensitive transfer ink, which is one example of coating materials 1a, lightly adhering in a layer to one face of a base material 1b in film form, a feed reel 2 on which an unused portion of the tape 1 is wound in a roll, a takeup reel 7 for taking up a used portion of the tape 1 in a roll, a pressure head 5 for pressing the pressure sensitive transfer ink 1a of the tape 1 to the receiving surface 4, and a plurality of tape guides 36 for guiding the tape 1 fed from the feed reel 2 to run through the front of a pressure surface 5a of the pressure head 5 to the takeup reel 7.

The feed reel 2 and takeup reel 7 are mounted in the case 6 to be rotatable on axes parallel to each other. The pressure head 5 is mounted in the case 6 as exposed to an opening a defined in the bottom of the case 6.

A rubber transmission belt 20 is wound around a large diameter pulley 18 formed on the feed reel 2 and a small diameter pulley 19 formed on the takeup reel 7. The takeup reel 7 has a higher rotational rate than the feed reel 2 so that the takeup rate of the takeup reel 7 always exceeds the feed rate of the feed reel 2 in spite of variations in the winding diameters of the tape 1 on the reels 2, 7. The difference between the takeup rate of the takeup reel 7 and the feed rate of the feed reel 2 is absorbed by slippage occurring between the transmission belt 20 and the pulleys 18, 19, to positively take up the tape 1 on the takeup reel 7 while avoiding an excessive tension acting on the tape 1.

The pressure head 5 defines a linear edge 32 at an upstream end of the pressure surface 5a with respect to a direction of tape feed.

The pressure sensitive transfer ink 1a of the tape 1 includes a pigment, a binding agent, a dispersing agent and the like suitably mixed thereto. The film-like base material 1b is formed of a resin (cellophane, polyimide, polyester, polyethylene, polystyrene, polypropylene or the like) or paper (condenser paper, glassine paper, synthetic paper, laminate paper or the like) with a release layer formed of silicone resin or the like.

The torque applying device L is constructed as follows:

The case 6 houses, in an upper portion thereof, a first rotary shaft 69 supporting the film removing member 58 and a second rotary shaft 72 carrying a large diameter gear 71 meshed with a small diameter gear 70 fixed to the first rotary shaft 69, extending parallel to each other. The second rotary shaft 72 has an end projecting outwardly of the case 6 and carrying a turning control knob 73.

The case 6 has a cylindrical recess 61 in an inner surface thereof accommodating a forced contact type spiral spring 14. The spiral spring 14 has a small-diameter end engaged and retained by the second rotary shaft 72, and a large-diameter end engaged and retained by the recess 61.

A method of using the transfer film transfer device will be described next.

First, the case 6 is held in one hand, the edge 32 of the pressure head 5 is set to a coating transfer starting position on the receiving surface 4, and the pressure surface 5a of the pressure head 5 is pressed through the tape 1 on the receiving surface 4. In this state, as shown in Fig. 54, the pressure head 5 is moved upstream with respect to a direction of tape feed, and the pressure sensitive transfer ink 1a of the tape 1 is transferred in film form to the receiving surface 4 (The film transferred to the receiving surface 4 will be affixed with the same number as the pressure sensitive transfer ink 1a).

At this time, with the movement of the pressure head 5, the tape 1 is forcibly fed from the feed reel 2, and the film-like base material 1b after the pressure sensitive transfer ink 1a is transferred to the receiving surface 4 is taken up on the takeup reel 7 rotating with the feed reel 2.

Next, when the edge 32 of the pressure head 5 reaches a coating transfer ending position on the

receiving surface 4, the case 6 is tilted on the edge 32, and the edge 32 is pressed hard at the transfer ending position of the pressure sensitive transfer ink 1a. This renders adhesion of the pressure sensitive transfer ink 1a to the receiving surface 4 at the transfer ending position sufficiently strong longitudinally of the edge 32.

By lifting the case 6 from the receiving surface 4 in this state, the pressure sensitive transfer ink 1a is linearly cut and separated at the transfer ending position.

When the pressure head 5 is caused inadvertently to overrun a transfer region in transferring the pressure sensitive transfer ink 1a, the case 6 is turned over as shown in Fig. 56, and the control knob 73 is turned.

The turning of the knob 73 elastically compresses the spiral spring 14 successively from the small diameter side, whereby rotational energy accumulates on the spiral spring 14.

Then, the film removing member 58 is set to an unwanted pressure sensitive transfer ink film 1a transferred outside a transfer region. When the knob 73 is released in this state, the second rotary shaft 72 rotates with elastic restoration of the spiral spring 14, and this rotation is transmitted to the first rotary shaft 69 in acceleration through the large diameter gear 71 and small diameter gear 70. As a result, the film removing member 58 is rotated at high speed until the spiral spring 14 returns to an original state.

Consequently, the film removing member 58 in high speed rotation is capable of quickly and reliably removing the unwanted pressure sensitive transfer ink film 1a transferred inadvertently from the receiving surface 4.

As shown in Fig. 57 and Fig. 58, it is possible to provide a ratchet mechanism 15 for preventing only rotation of the second rotary shaft 72 due to the elastic restoration of the spiral spring 14, and a disengaging member 16 for switching an engaging pawl 14a to a release position, the engaging pawl 15a forming the ratchet mechanism 15 in combination with a ratchet wheel 11b.

In this embodiment, the elastic restoration of the spiral spring 14 is started by the release operation of the disengaging member 16. Thus, it is unnecessary to keep holding the knob 73 against the elastic restoring force of the spiral spring 14 as in the foregoing embodiment. This facilitates removal of the pressure sensitive transfer ink film 1a transferred inadvertently.

Fig. 59 shows a torque applying device L in a different embodiment. The case 6 houses, in an upper portion thereof, a first rotary shaft 77 supporting the film removing member 58 and a second rotary shaft 80 carrying a large diameter gear 79 meshed with a small diameter gear 68 fixed to the first rotary shaft 77, extending parallel to each other. The second rotary shaft 80 carries a control wheel 81 projecting outwardly through an opening defined in a top of the case 6.

The case 6 has a cylindrical recess 62 in an inner surface thereof accommodating a forced contact type spiral spring 14. The spiral spring 14 has a small-diameter end engaged and retained by an end of the first rotary shaft 77, and a large-diameter end engaged and retained by the recess 62.

The film removing member 58 includes a bar-like sand rubber eraser 58a and a holder 58b removably supporting the sand rubber eraser 58a. The holder 58b is attachable and detachable to/from a tubular section continuous with the other end of the first rotary shaft 77.

The case 6 defines a storage chamber V in an upper portion thereof for storing a plurality of sand rubber erasers 58a and the holder 58 when out of use.

When the pressure sensitive transfer ink 1a is transferred also outside a transfer region by a transfer operation error, the case 6 is turned over as shown in Fig. 60, and the case 6 is moved with the control wheel 81 contacting the receiving surface 4 or the like.

With rolling of the control wheel 81, torque of the second rotary shaft 80 is transmitted through the large diameter gear 79, small diameter gear 68 and first rotary shaft 77 to the spiral spring 14. This elastically compresses the spiral spring 14 successively from the small diameter side, whereby rotational energy accumulates on the spiral spring 14.

As shown in Fig. 61, the sand rubber eraser 58a of the film removing member is set to an unwanted pressure sensitive transfer ink film 1a transferred outside the transfer region. When the control wheel 81 is released in this state, the sand rubber eraser 58a rotates with elastic restoration of the spiral spring 14.

Consequently, the sand rubber eraser 58a in high speed rotation is capable of quickly and reliably removing the unwanted pressure sensitive transfer ink film 1a transferred inadvertently from the receiving surface 4.

The above embodiments have been described in relation to the torque applying device L of the type that stores rotational energy on the spiral spring 14. Instead of using the spiral spring 14, rotational energy may be stored by using inertial force of a flywheel 33 as shown in Fig. 62 and Fig. 63. The film removing member 58 and the manual control member may be interconnected through an accelerative rotation transmitting mechanism such as an accelerating gear mechanism.

In short, the torque applying device L will serve the purpose only if capable of applying torque to the film removing member 58 by means of a

manual operation.

The torque applying device L shown in Fig. 62 and Fig. 63 is such that the case 6 houses, arranged parallel to one another, a first rotary shaft 25 carrying a rotary brush 58 acting as the film removing member, a second rotary shaft 28 carrying a second gear 23 meshed with a first gear 24 fixed to the first rotary shaft 25, and a third rotary shaft 34 carrying a fourth gear 30 meshed with a third gear 22 fixed to the second rotary shaft 28.

The third shaft 34 carries a control wheel 35 projecting outwardly through an opening defined in the case 6. The control wheel 35 has an antislip rubber layer 35a formed peripherally thereof. The second rotary shaft 28 carries a flywheel 33 having a large mass.

When the pressure sensitive transfer ink 1a is transferred also outside a transfer region by a transfer operation error, the case 6 is vertically turned over, and the case 6 is moved with the control wheel 35 contacting the receiving surface 4 or the like.

With rolling of the control wheel 81, torque of the third rotary shaft 34 is transmitted through the fourth gear 30, third gear 22 and second rotary shaft 28 to the flywheel 33. This rotates the flywheel 33 at an increasing speed to store rotational energy.

The rotary brush 58 is forcibly rotated by the rotational energy accumulated on the flywheel 33. Thus, by setting the rotary brush 58 to the unwanted pressure sensitive transfer ink film 1a transferred outside the transfer region, the unwanted pressure sensitive transfer ink film 1a transferred inadvertently is removed quickly and reliably from the receiving surface 4.

The above embodiments have been described taking the brush type and sand rubber eraser type as examples of the film removing member 58. These constructions are not limitative. For example, the construction may include a grinding stone, or a blade in the form of a side milling cutter or a shell end mill.

In other words, the film removing member 58 may have any kind of construction only if rotatable to remove the coating film 1a transferred to the receiving surface 4.

The foregoing embodiments use the coating material of the pressure sensitive transfer type, but it may be the heat sensitive transfer type.

Further, the foregoing embodiments have been described in relation to the coating material comprising opaque transfer ink for erasing characters or pictures formed on the receiving surface 4. However, the coating material may be a transparent adhesive for pasting.

Still further, the foregoing embodiments use the transfer ink 1a formed in a layer on the tape-like base material 1b. However, the transfer ink 1a itself may be formed in a film, or liquid ink may be applied.

In other words, the coating transfer device E may have any kind of construction only if capable of transferring the coating material 1a in film form to the receiving surface 4.

A transfer film transfer device in a further embodiment will be described.

Fig. 64 shows a transfer film transfer device comprising a case 6 including a storage section 3 having a feed reel 2 holding a picture revising tape 1 wound thereon in a roll form to be fed out, the picture revising tape 1 having a white pressure sensitive transfer film 1a lightly adhering in film form to a base material 1b, and a pressure head 5 for pressing on a receiving surface 4 the transfer film 1a of the tape 1 fed from the storage section 3.

The tape 1 runs from the feed reel 2 past a pressure surface 5a of the pressure head 5 to be taken up on the takeup reel 7 rotatable on an axis approximately parallel to a rotational axis of the feed reel 2. The feed reel 2 and takeup reel 7 are operatively interconnected through an interlocking mechanism 21 provided laterally inside the case 6. As the tape 1 is fed from the feed reel 2, the base material 1b is taken up on the takeup reel 7 after the paint film 1a is transferred by the pressure head 5.

The interlocking mechanism 21 comprises a rubber transmission belt 20 wound around a large diameter pulley 18 fixed to the feed reel 2 and a small diameter pulley 19 fixed to the takeup reel 7. The takeup reel 7 has a higher rotational rate than the feed reel 2 so that the takeup rate of the takeup reel 7 always exceeds the feed rate of the feed reel 2 in spite of variations in the winding diameters of the tape 1 on the reels 2, 7. The difference between the takeup rate of the takeup reel 7 and the feed rate of the feed reel 2 is absorbed by slippage occurring between the transmission belt 20 and the pulleys 2a, 19, to positively take up the tape 1 on the takeup reel 7 while avoiding an excessive tension acting on the tape 1.

The tape 1 has a resin or paper base material 1b with a release layer formed of silicone resin or the like, and a paint film 1a including a pigment, a binding agent, a dispersing agent and the like and lightly adhering thereto through the release layer. The paint film 1a has an adhesive layer formed thereon to be pressed by the pressure head 5 for adhesion to the receiving surface 4.

A removing device I is provided on a running path of the tape 1 fed from the storage section 3, upstream of a position opposed to the head 5, for removing a side of the paint film 1a from the tape 1 in a way to vary a removal width.

Specifically, as shown in Fig. 65 and Fig. 66,

the removing device I comprises a remover 90 including, as a principal part thereof, a combination of a backup roll 90a disposed inwardly of the running path of the tape 1 and rotatably supported to contact an entire width of the tape 1, and a pair of separator rollers 90b, 90c arranged outwardly of the running path of the tape 1 to sandwich the tape 1 with the backup roll, and having adhesive layers formed on surfaces thereof for adhering to and removing the paint film 1a of the tape 1. The pair of separator rollers 90b, 90c are pulled toward the backup roll 90a to assume operative positions by tension springs 90d, 90e, and are oscillatably supported by arms 90f, 90g and maintained in retracted positions away from the tape 1 by control levers 90h, 90I, respectively. Thus, by moving the separator rollers 90b, 90c away from the tape 1 in combination or individually, three ways are provided in which the separator rollers 90b, 90c are moved away from a side of the paint film 1a. In addition, it is possible to provide a condition in which the separator rollers 90b, 90c are both contacting the side of the paint film 1a. With the plurality of such conditions, removal (peeling) can be made from the tape 1 in a way to vary the removal width (peeling width). Scrapers 90j, 90k are disposed at appropriate positions adjacent peripheries of the separator rollers 90b, 90c for scraping off the paint film 1a peeled and adhering to the separator rollers 90b, 90c. The scrapers 90j, 90k scrape off the paint film 1a, thereby avoiding a situation in which the paint film 1a adhering to and remaining on the separator rollers 90b, 90c becomes obstructive to fresh adhesion and removal of the paint film 1a by the separator rollers 90b, 90c.

According to the paint film transfer device in this embodiment, even when the paint film 1a of the tape 1 has a fixed width, the remover 90 is used to remove a side of the paint film 1a from the tape 1 in a variable width manner, thereby varying the transfer width of the paint film 1a.

As shown in Fig. 67 and Fig. 68, a removing device I may comprise a scraper type remover 91 provided on the running path of the tape 1 fed from the storage section 3, upstream of a position opposed to the head 5, for scraping off a side of the paint film 1a from the tape 1, which is movable transversely of the tape. More particularly, the case 6 carries a retainer 91a defining a slot, and a separator pawl 91b forming a principal component of the remover 91 is inserted into the slot for contacting the tape 1. The separator pawl 91b is tightened to a suitable position by a bolt 91c to vary its position transversely of the tape.

According to this paint film transfer device, even when the paint film 1a of the tape 1 has a fixed width, the remover 91 is used to remove a side of the paint film 1a from the tape 1 in a variable width manner, thereby varying the transfer width of the paint film 1a.

The present invention of course is applicable where, in transferring the paint film 1a of the tape 1 to the receiving surface 4, a pressure head (not shown) is used instead of the pressure head 5 for thermal transfer of a thermal transfer paint film.

[INDUSTRIAL APPLICABILITY]

As described, a transfer film transfer device of the present invention is suited for transferring a filmy coating material mixed with a pigment and the like to a receiving surface for the purpose of easy erasing or easy pasting of characters and pictures, and a filmy adhesive to a receiving surface of paper for the purpose of bonding sheets of paper.

Claims

1. A transfer film transfer device comprising;
a feed reel (2) for winding and storing, prior to feeding, a tape (1) having a transfer film formed in film form which is transferable to a receiving surface (4) by pressing or heating, and a takeup reel (7) for taking up the tape (1) fed,
a head (5) for contacting and pressing or heating, for transfer to the receiving surface (4), the tape (1) fed from said feed reel (2) or the transfer film separated from said tape (1), and
a case (6) housing said feed reel (2), takeup reel (7) and head (5).

2. A transfer film transfer device as set forth in claim 1, further comprising frictional transmission means (F) having a roller (10), (13) disposed in a torque transmitting portion between said feed reel (2) and said takeup reel (7) and rotatable following one of said two reels (2), (7) and having a peripheral surface thereof in frictional contact with the other reel for frictional transmission,
wherein said two reels (2), (7) have different diameters or said frictional transmission means (F) comprises a roller (13) rotatable with said takeup reel (7) and inscribing an inner surface of said feed reel (2), so that said takeup reel (7) has a takeup rate always equal to or exceeding a feed rate of the tape (1) by said feed reel (2), and
the difference in said two rates is absorbed by utilizing slippage occurring at the peripheral surface acting as a frictional contact portion of

the roller (10), (13).

3. A transfer film transfer device as set forth in claim 1, further comprising a circulating endless body (20) to function as frictional transmission means provided between a feed-side pulley (18) rotatable with said feed reel (2) and a takeup-side pulley (19) rotatable with said takeup reel (7),
said two pulleys (18), (19) having different diameters so that said takeup reel (7) has a takeup rate always equal to or greater than a feed rate of the tape (1) by said feed reel (2), and the difference between said two rates is absorbed by utilizing slippage occurring at least partly between said circulating endless body (20) and said two pulleys (18), (19).

4. A transfer film transfer device as set forth in claim 1, wherein said head (5) includes a facial press portion (5a) for facial contact with said transfer film (1a) and pressing it on said receiving surface (4), a linear press portion (5b) for linear contact in a transverse direction with the transfer film (1a) pressed on said receiving surface (4) and pressing it on said receiving surface (4), and urging means (S) for urging said linear press portion (5b) to a position to press said transfer film (1a) on said receiving surface (4).

5. A transfer film transfer device as set forth in claim 1, wherein the transfer tape (1) is wound in a pancake form on said feed reel (2), a pressure contact mechanism (100) being provided for causing a pressure contact between an outer periphery of the transfer tape (1) as wound and an outer periphery of the transfer tape (1) taken up on said takeup reel (7), rotation of said pancake-like transfer tape (1) and rotation of said takeup reel (7) being interlocked through the pressure contact caused by said pressure contact mechanism (100).

6. A transfer film transfer device as set forth in claim 5, wherein said head (5) transfers an entire width of the transfer film (1a) of said tape (1) to the receiving surface (4).

7. A transfer film transfer device as set forth in claim 1, wherein said head (5) includes a linear edge (49) formed downstream of a pressure surface (5a) with respect to a running direction of the head and extending transversely of the tape, said pressing surface (5a) and an imaginary plane (T) including said linear edge (48) and contacting a peripheral surface (6i) of said case (6) cross each other with said case (6) in between.

8. A transfer film transfer device as set forth in claim 1, further comprising running means (R) for causing the tape fed from a storage section (3) storing said tape to be fed, to run along a fixed path, a scraper (5c) pressed on the transfer film (1a) of the tape (1) running along said fixed path for separating the transfer film (1a) from the base material (1b), and a pressing section (5a) for pressing on and transferring to the receiving surface (4) the transfer film (1a) separated by said scraper (5c).

9. A transfer film transfer device as set forth in claim 8, wherein said scraper (5c) and said pressing section (5a) are non-adhesive to said transfer film (1a).

10. A transfer film transfer device as set forth in claim 8 or 9, wherein said pressing section (5a) is defined by a peripheral surface of a pressure roller (37) for guiding the transfer film (1a) separated by said scraper (5c) toward the receiving surface (4), a cutter (31) being provided for cutting the transfer film (1a) wound on said pressure roller (37).

11. A transfer film transfer device as set forth in claim 1, wherein said head (5) is capable of varying a pressing or heating width for said paint film (1a) transversely of the tape.

12. A transfer film transfer device as set forth in claim 1, wherein said transfer film (1a) is a heat sensitive transfer film, and said head (5) includes a heating roller (45), the heating roller (45) being rotatable in contact with said pressure sensitive transfer film (1a) to heat and soften or fuse the pressure sensitive transfer film (1a), the softened or fused pressure sensitive transfer film (1a) being transferred in the softened or fused state from the base material (1b) of the tape to a peripheral surface (45a) of said heating roller, and with rotation of said heating roller (45) the pressure sensitive transfer film (1a) transferred to and held on the peripheral surface (45a) being transferred to the receiving surface (4).

13. A transfer film transfer device as set forth in claim 1, wherein said transfer film (1a) is a heat sensitive type adhesive layer, a feed mechanism (K) being provided to feed the tape (1) from a storage section (3) storing the tape (1) having the heat sensitive type adhesive layer (1a) as said head (5) is run while being pressed on the receiving surface (4), and feed-

ing said heat sensitive type adhesive layer (1a) to a heating and pressing surface (5a) of said head (5), and heating and pressing means for bonding (5 or 51) being provided to heat and press the heat sensitive type adhesive layer (1a) again which has been applied to the receiving surface (4).

14. A transfer film transfer device as set forth in claim 1, wherein said case (6) includes a film removing device (H) for removing the transfer film (1a) transferred to said receiving surface (4).

15. A transfer film transfer device as set forth in claim 14, wherein said film removing device (H) comprises a scraper (59) switchable between a use position projecting outwardly of said case (6) and a non-use position contained in the case (6).

16. A transfer film transfer device as set forth in claim 14, wherein said film removing device (H) includes a tape (111) with an adhesive layer (111a) formed on one face of a film-like base material (111b) and having a greater adhesive strength than cohesion between said receiving surface (4) and the transfer film (1a), a tape storage (112) for storing the tape (111) to be fed, and a pressure head (113) for pressing the adhesive layer (111a) of the tape (111) unwound and fed from said tape storage (112).

17. A transfer film transfer device as set forth in claim 1, wherein said case (6) includes a rotatable film removing member (58) for removing the transfer film (1a) transferred to said receiving surface (4), and a torque applying means (L) manually operable for applying torque to said film removing member (58).

18. A transfer film transfer device as set forth in claim 1, further comprising removing means (I) disposed on a running path of the tape (1) fed from a storage section (3) storing said tape (1) to be fed, upstream of a position opposed to the head (5), for removing a side of said transfer film (1a) from the tape (1) in a way to vary a removal width.

19. A transfer film transfer device as set forth in claim 18, wherein said removing means (I) includes a remover (90) switchable between an operative position and a retracted position, for removing the side of said transfer film (1a).

20. A transfer film transfer device as set forth in claim 18, wherein said removing means (I) includes a remover (90) movable transversely of the tape, for removing the side of said transfer film (1a).

AMENDED CLAIMS

1. Canceled

2. (amended) A transfer film transfer device comprising;
a feed reel (2) for winding and storing, prior to feeding, a tape (1) having a transfer film (1a) formed in film form which is transferable to a receiving surface (4) by pressing or heating, and a takeup reel (7) for taking up the tape (1) fed,
a head (5) for contacting and pressing or heating, for transfer to the receiving surface (4), the tape (1) fed from said feed reel (2) or the transfer film separated from said tape (1), and
a case (6) housing said feed reel (2), takeup reel (7) and head (5),
characterized in that
said transfer film transfer device further comprises frictional transmission means (F) having a roller (10), (13) disposed in a torque transmitting portion between said feed reel (2) and said takeup reel (7) and rotatable following one of said two reels (2), (7) and having a peripheral surface thereof in frictional contact with the other reel for frictional transmission,
wherein said two reels (2), (7) have different diameters or said frictional transmission means (F) comprises a roller (13) rotatable with said takeup reel (7) and inscribing an inner surface of said feed reel (2), so that said takeup reel (7) has a takeup rate always equal to or exceeding a feed rate of the tape (1) by said feed reel (2), and
the difference in said two rates is absorbed by utilizing slippage occurring at the peripheral surface acting as a frictional contact portion of the roller (10), (13).

3. (amended) A transfer film transfer device comprising;
a feed reel (2) for winding and storing, prior to feeding, a tape (1) having a transfer film (1a) formed in film form which is transferable to a receiving surface (4) by pressing or heating, and a takeup reel (7) for taking up the tape (1) fed,
a head (5) for contacting and pressing or heating, for transfer to the receiving surface (4), the tape (1) fed from said feed reel (2) or the transfer film separated from said tape (1), and
a case (6) housing said feed reel (2), takeup reel (7) and head (5),

characterized in that
said transfer film transfer device further comprises a circulating endless body (20) to function as frictional transmission means provided between a feed-side pulley (18) rotatable with said feed reel (2) and a takeup-side pulley (18) rotatable with said takeup reel (7),
said two pulleys (18), (19) having different diameters so that said takeup reel (7) has a takeup rate always equal to or greater than a feed rate of the tape (1) by said feed reel (2), and the difference between said two rates is absorbed by utilizing slippage occurring at least partly between said circulating endless body (20) and said two pulleys (18), (19).

4. (amended) A transfer film transfer device as set forth in claim 2, wherein said head (5) includes a facial press portion (5a) for facial contact with said transfer film (1a) and pressing it on said receiving surface (4), a linear press portion (5b) for linear contact in a transverse direction with the transfer film (1a) pressed on said receiving surface (4) and pressing it on said receiving surface (4), and urging means (S) for urging said linear press portion (5b) to a position to press said transfer film (1a) on said receiving surface (4).

5. (amended) A transfer film transfer device as set forth in claim 2, wherein said head (5) includes a linear edge (49) formed downstream of a pressure surface (5a) with respect to a running direction of the head and extending transversely of the tape, said pressing surface (5a) and an imaginary plane (T) including said linear edge (48) and contacting a peripheral surface (6i) of said case (6) cross each other with said case (6) in between.

6. (amended) A transfer film transfer device as set forth in claim 2, further comprising running means (R) for causing the tape fed from a storage section (3) storing said tape to be fed, to run along a fixed path, a scraper (5c) pressed on the transfer film (1a) of the tape (1) running along said fixed path for separating the transfer film (1a) from the base material (1b), and a pressing section (5a) for pressing on and transferring to the receiving surface (4) the transfer film (1a) separated by said scraper (5c).

7. (amended) A transfer film transfer device as set forth in claim 5, wherein said scraper (5c) and said pressing section (6a) are non-adhesive to said transfer film (1a).

8. (amended) A transfer film transfer device as set forth in claim 5 or 6, wherein said pressing section (5a) is defined by a peripheral surface of a pressure roller (37) for guiding the transfer film (1a) separated by said scraper (5c) toward the receiving surface (4), a cutter (31) being provided for cutting the transfer film (1a) wound on said pressure roller (37).

9. (amended) A transfer film transfer device as set forth in claim 2, wherein said head (5) is capable of varying a pressing or heating width for said paint film (1a) transversely of the tape.

10. (amended) A transfer film transfer device as set forth in claim 2, further comprising removing means (I) disposed on a running path of the tape (1) fed from a storage section (3) storing said tape (1) to be fed, upstream of a position opposed to the head (5), for removing a side of said transfer film (1a) from the tape (1) in a way to vary a removal width.

11. (amended) A transfer film transfer device as set forth in claim 9, wherein said removing means (I) includes a remover (90) switchable between an operative position and a retracted position, for removing the side of said transfer film (1a).

12. (amended) A transfer film transfer device as set forth in claim 9, wherein said removing means (I) includes a remover (90) movable transversely of the tape, for removing the side of said transfer film (1a).

13. (amended) A transfer film transfer device as set forth in claim 2, wherein said case (6) includes a film removing device (H) for removing the transfer film (1a) transferred to said receiving surface (4).

14. (amended) A transfer film transfer device as set forth in claim 12, wherein said film removing device (H) comprises a scraper (59) switchable between a use position projecting outwardly of said case (6) and a non-use position contained in the case (6).

15. (amended) A transfer film transfer device as set forth in claim 12, wherein said film removing device (H) includes a tape (111) with an adhesive layer (111a) formed on one face of a film-like base material (111b) and having a greater adhesive strength than cohesion between said receiving surface (4) and the transfer film (1a), a tape storage (112) for storing the tape (111) to be fed, and a pressure head

(113) for pressing the adhesive layer (111a) of the tape (111) unwound and fed from said tape storage (112).

16. (amended) A transfer film transfer device as set forth in claim 2, wherein said case (6) includes a rotatable film removing member (58) for removing the transfer film (1a) transferred to said receiving surface (4), and a torque applying means (L) manually operable for applying torque to said film removing member (58).

17. (amended) A transfer film transfer device as set forth in claim 2, wherein said transfer film (1a) is a heat sensitive type adhesive layer, a feed mechanism (K) being provided to feed the tape (1) from a storage section (3) storing the tape (1) having the heat sensitive type adhesive layer (1a) as said head (5) is run while being pressed on the receiving surface (4), and feeding said heat sensitive type adhesive layer (1a) to a heating and pressing surface (5a) of said head (5), and heating and pressing means for bonding (5 or 51) being provided to heat and press the heat sensitive type adhesive layer (1a) again which has been applied to the receiving surface (4).

18. (amended) A transfer film transfer device as set forth in claim 2, wherein said transfer film (1a) is a heat sensitive transfer film, and said head (5) includes a heating roller (45), the heating roller (45) being rotatable in contact with said pressure sensitive transfer film (1a) to heat and soften or fuse the pressure sensitive transfer film (1a), the softened or fused pressure sensitive transfer film (1a) being transferred in the softened or fused state from the base material (1b) of the tape to a peripheral surface (45a) of said heating roller, and with rotation of said heating roller (45) the pressure sensitive transfer film (1a) transferred to and held on the peripheral surface (45a) being transferred to the receiving surface (4).

19. (amended) A transfer film transfer device comprising;
a feed reel (2) for winding and storing, prior to feeding, a tape (1) having a transfer film (1a) forced in film form which is transferable to a receiving surface (4) by pressing or heating, and a takeup reel (7) for taking up the tape (1) fed,
a head (5) for contacting and pressing or heating, for transfer to the receiving surface (4), the tape (1) fed from said feed reel (2) or the transfer film separated from said tape (1), and
a case (6) housing said feed reel (2), takeup reel (7) and head (5),
characterized in that
said transfer tape (1) is wound in a pancake form on said feed reel (2), a pressure contact mechanism (100) being provided for causing a pressure contact between an outer periphery of the transfer tape (1) as wound and an outer periphery of the transfer tape (1) taken up on said takeup reel (7), rotation of said pancake-like transfer tape (1) and rotation of said takeup reel (7) being interlocked through the pressure contact caused by said pressure contact mechanism (100).

20. (amended) A transfer film transfer device as set forth in claim 18, wherein said head (6) transfers an entire width of the transfer film (1a) of said tape (1) to the receiving surface (4).

FIG. 1

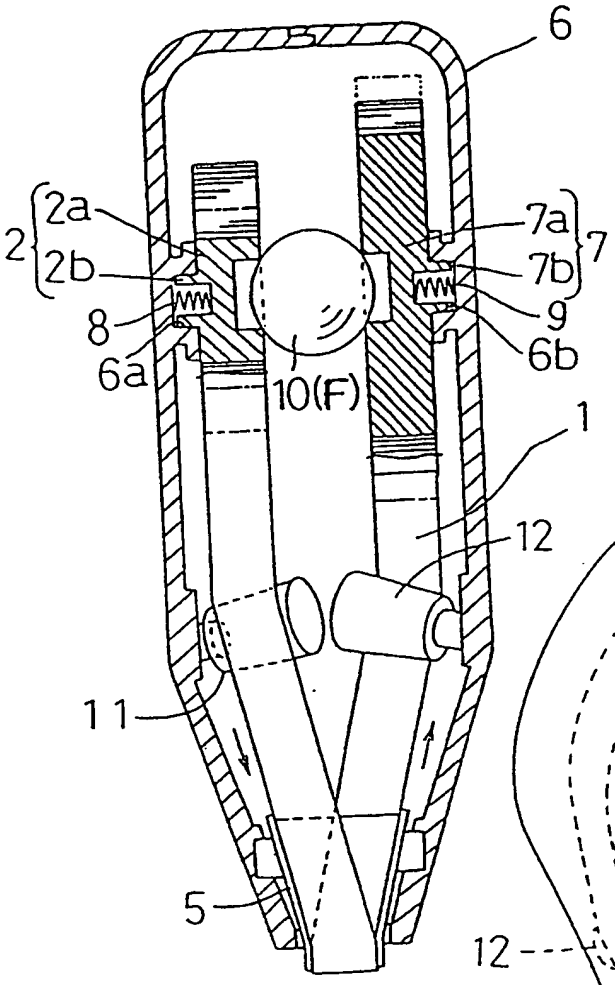


FIG. 2

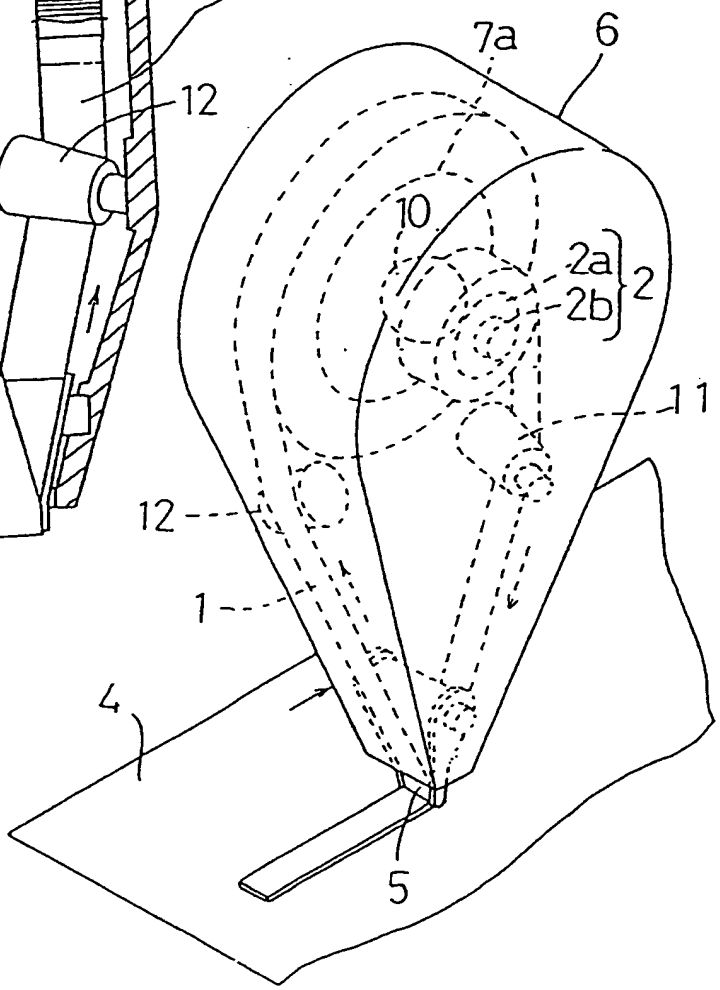


FIG. 3

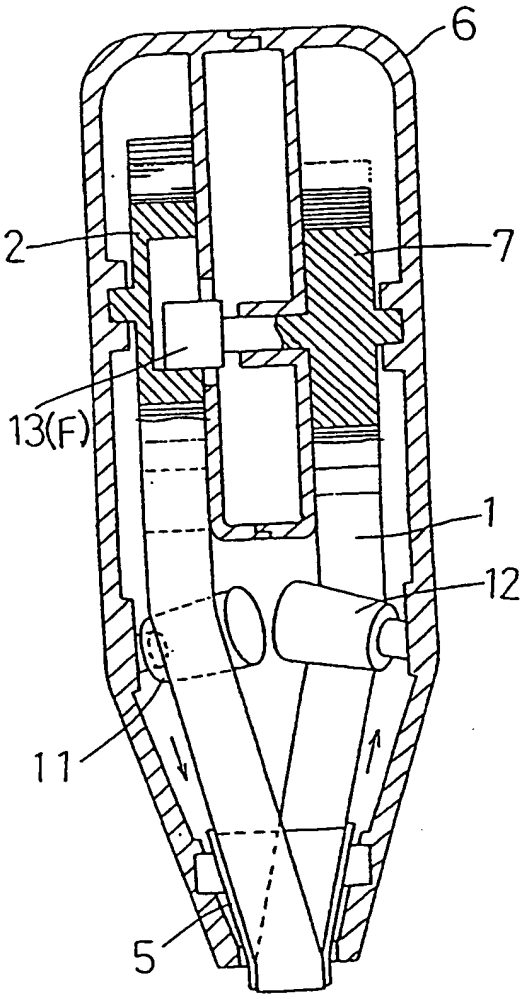


FIG. 4

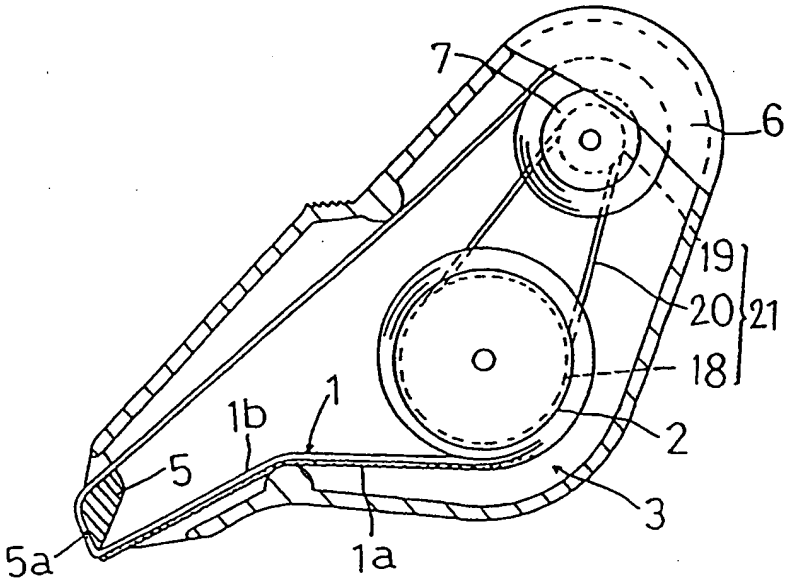


FIG. 5

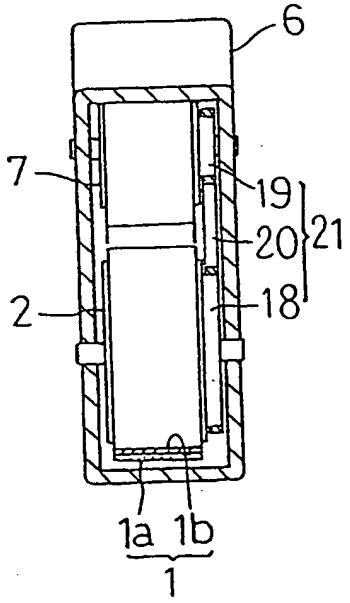


FIG. 6

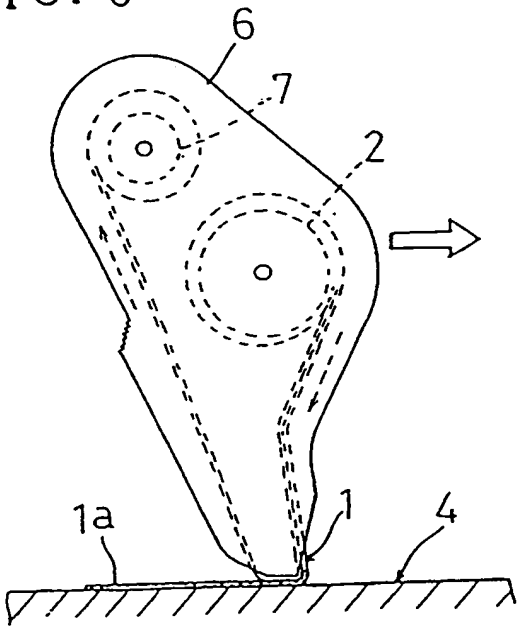


FIG. 7

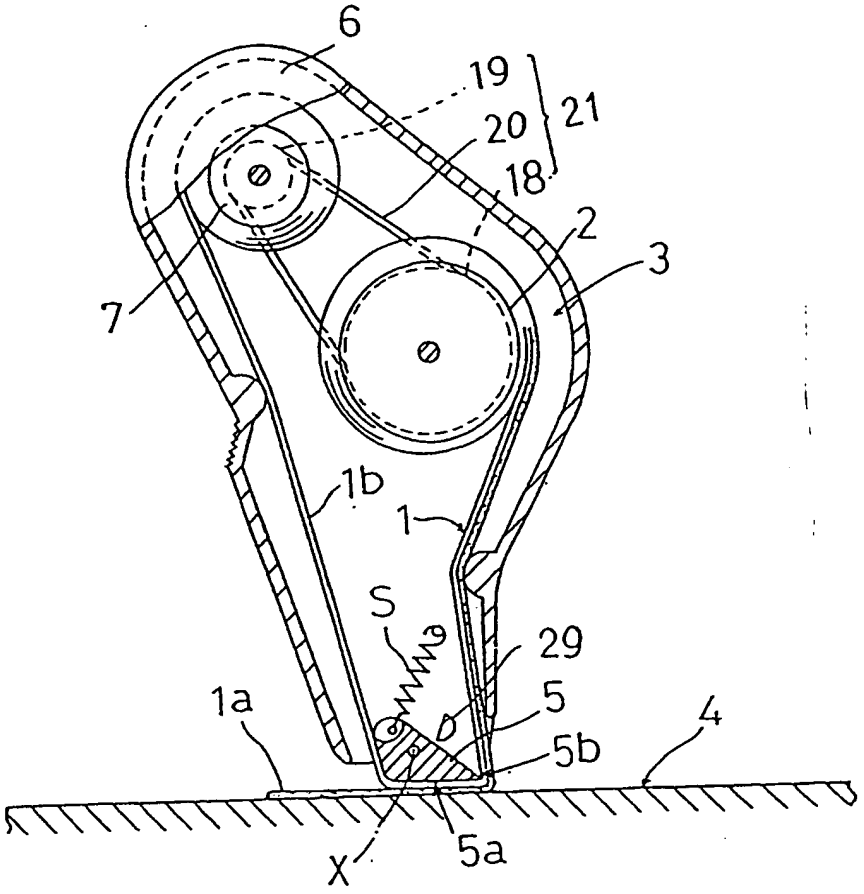


FIG. 8

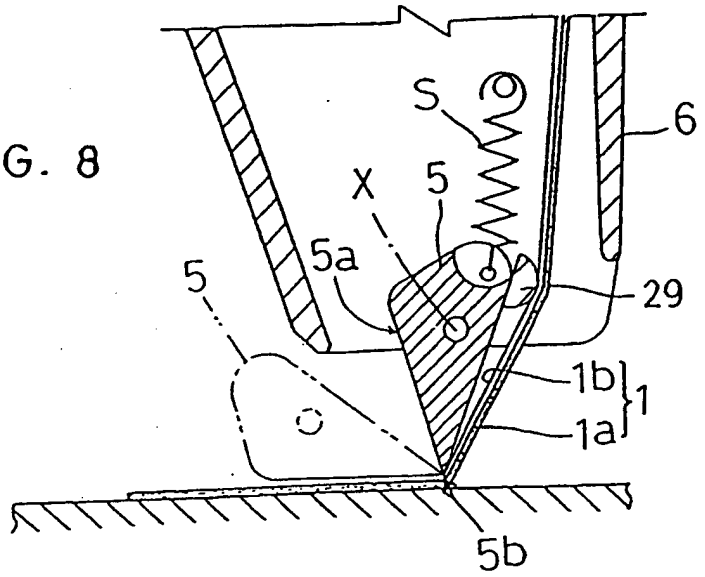


FIG. 9

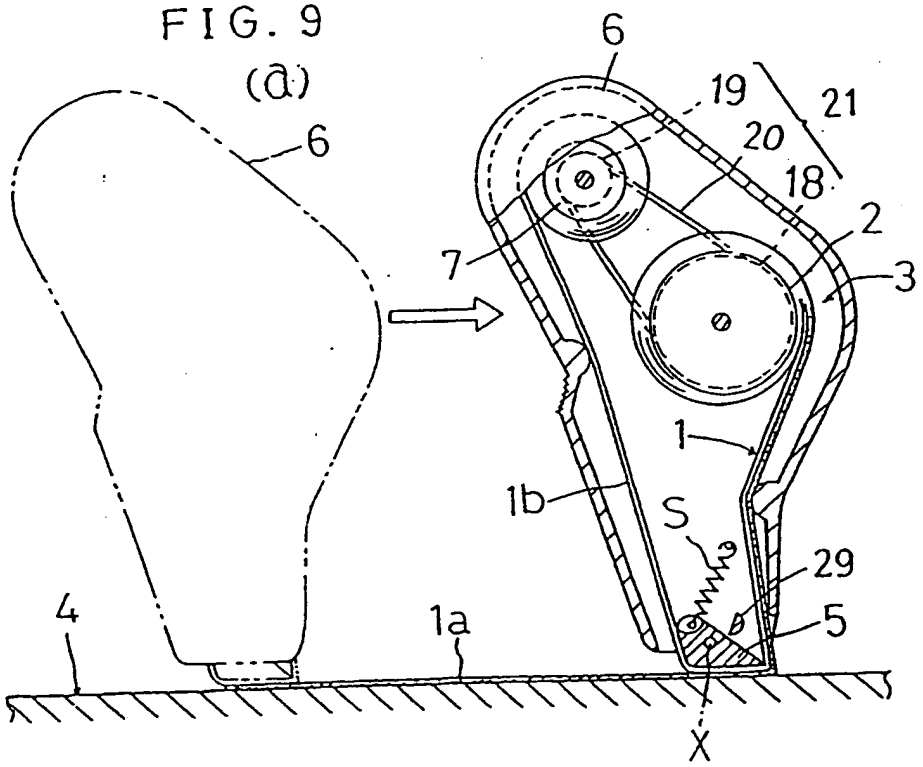


FIG. 9

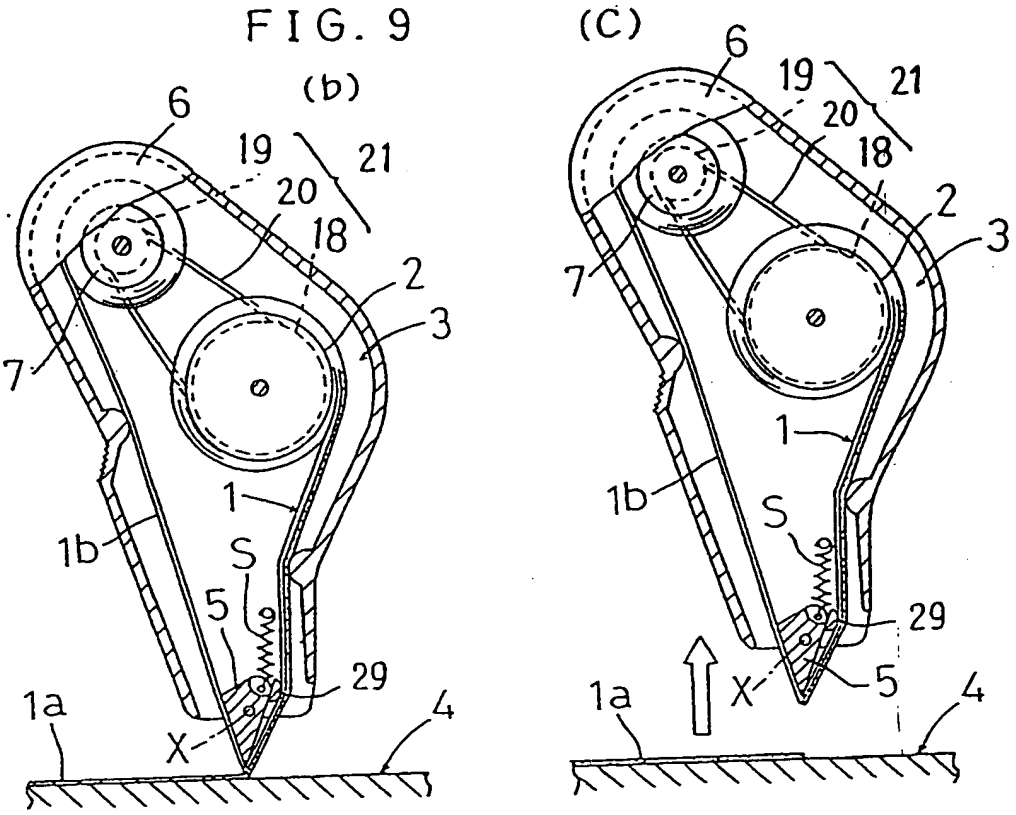

(b)
6
19
21
20
18
2
3
7
1
1b
S
5
29
1a
X
4
(C)
6
19
21
20
18
2
3
7
1
1b
S
29
1a
X
5
4

FIG. 10

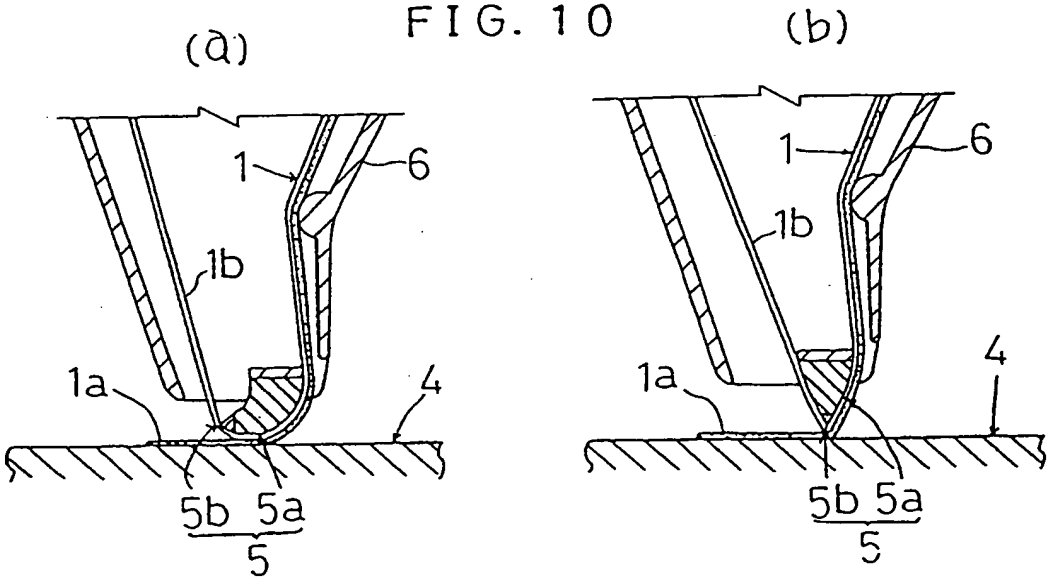

(a)
1
6
1b
1a
4
5b
5a
5
(b)
1
6
1b
1a
4
5b
5a
5

FIG. 11

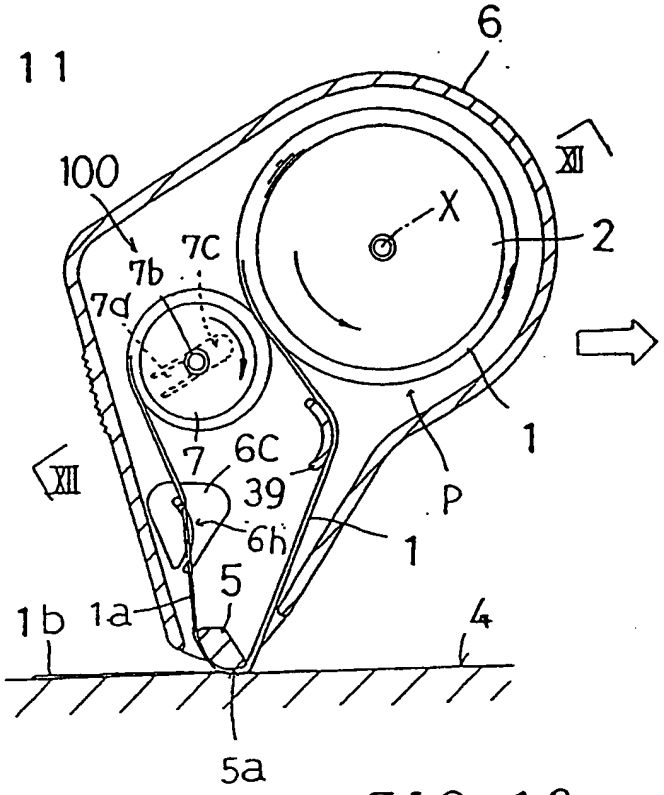


FIG. 12

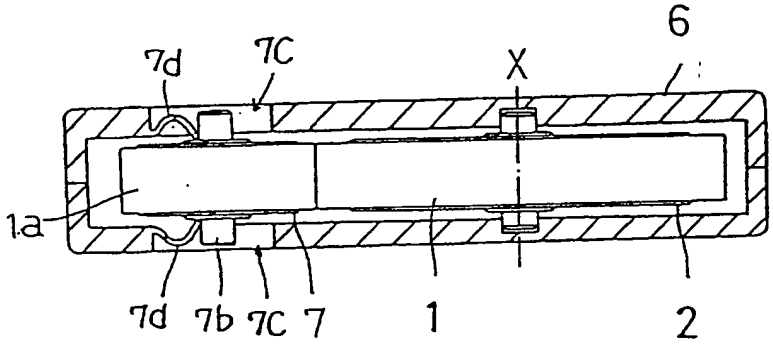


FIG. 13

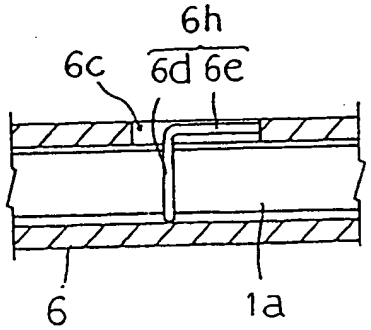


FIG. 14

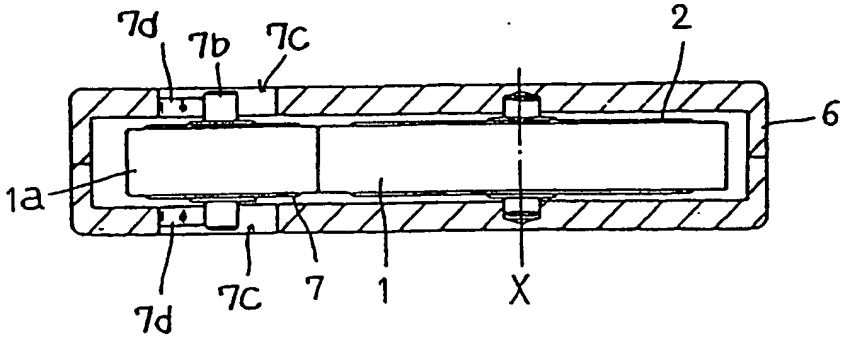


FIG. 15

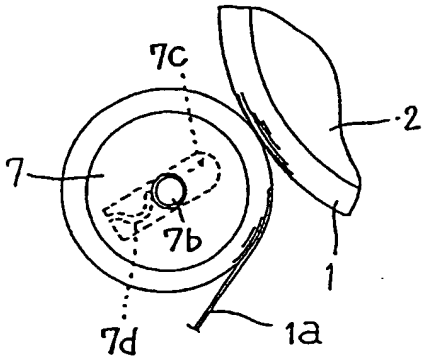


FIG. 18

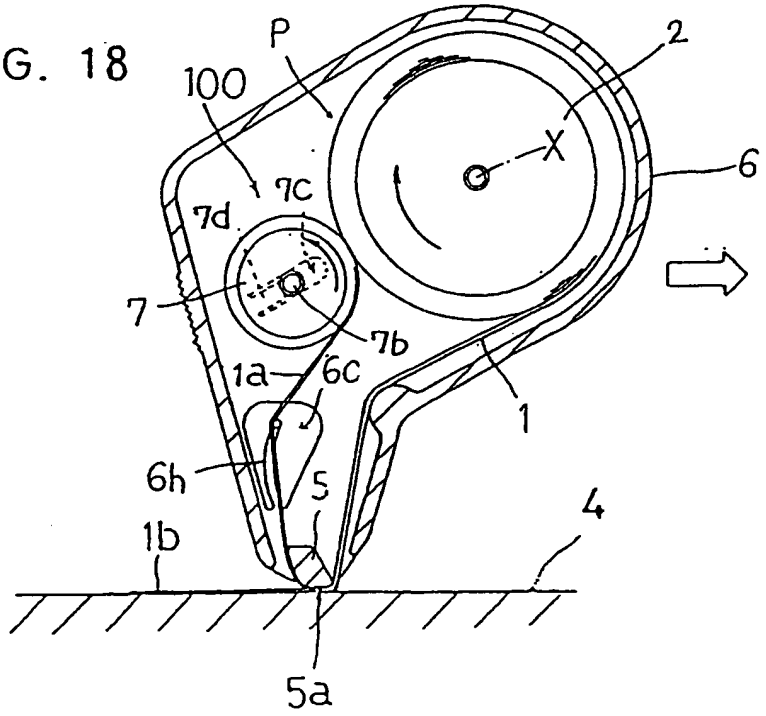


FIG.16

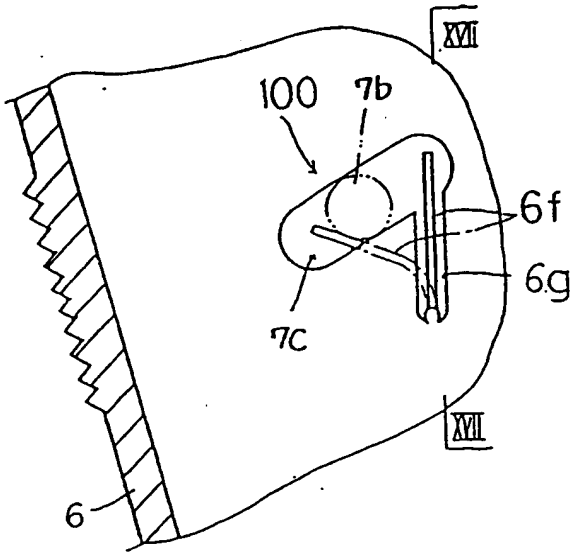


FIG.17

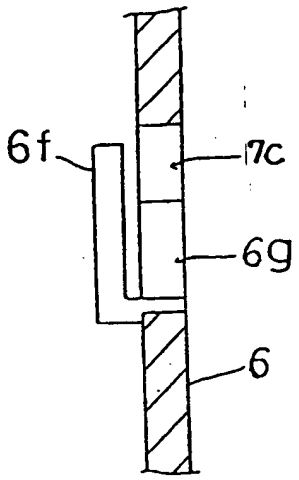


FIG.19

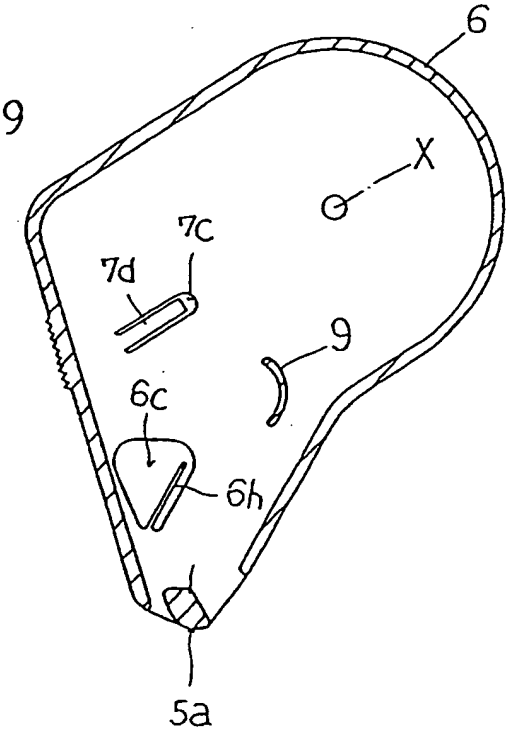


FIG. 20

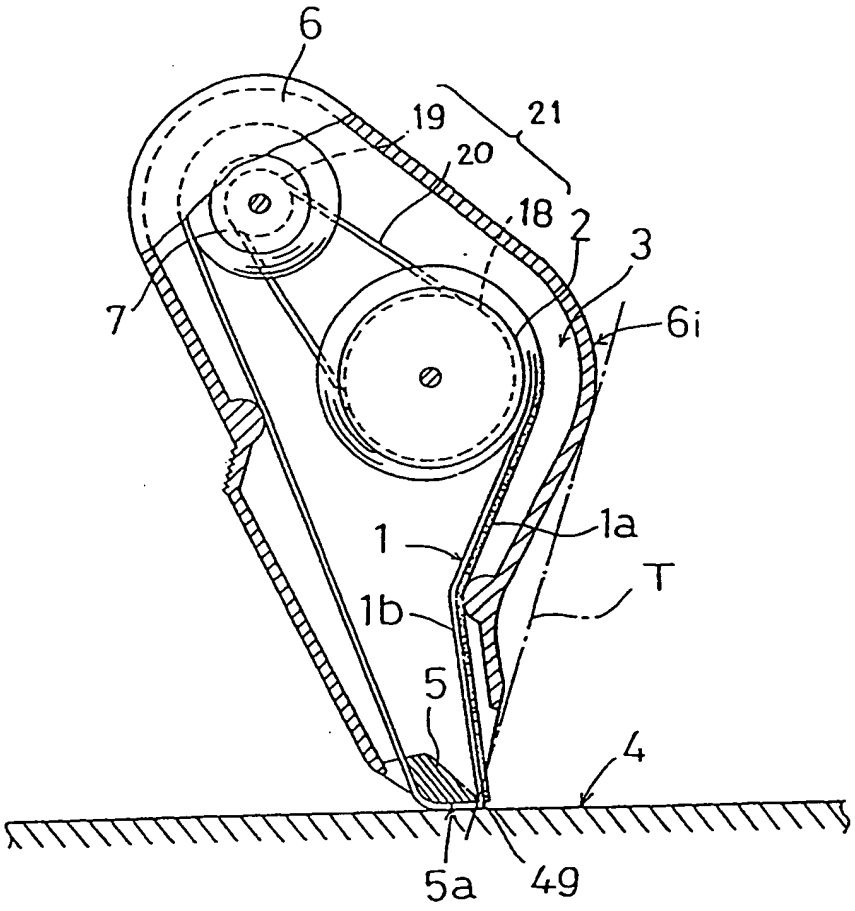


FIG. 21

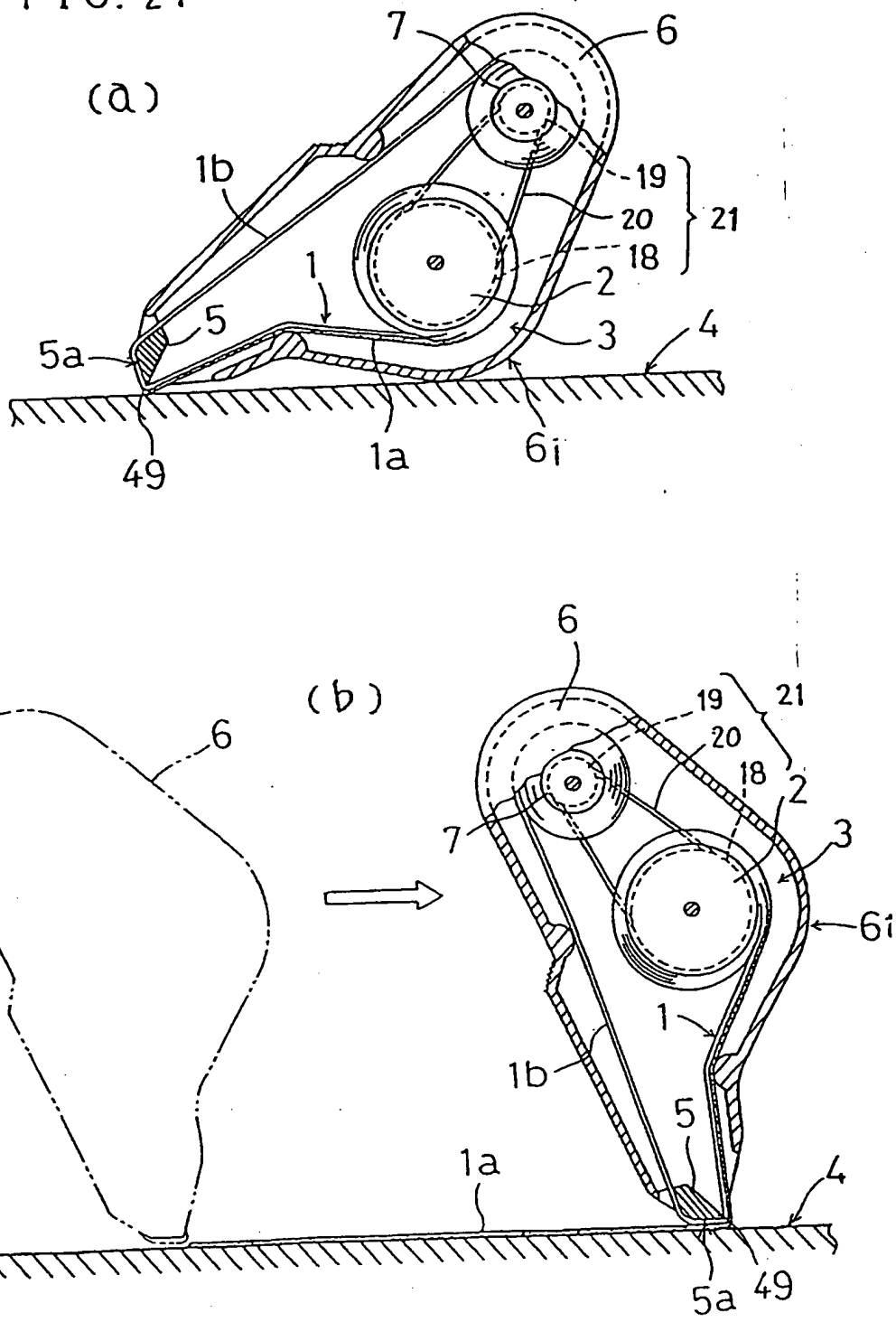
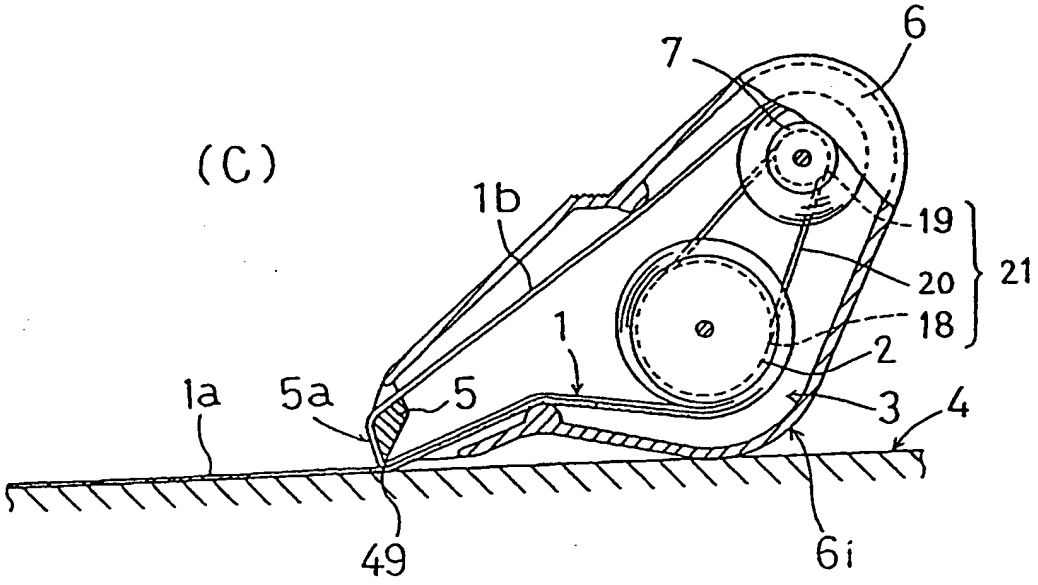

(a)
7
6
1b
19
20
21
18
1
2
5
3
4
5a
49
1a
6i
(b)
6
19
21
20
18
2
7
3
6i
1
1b
5
1a
4
5a
49

FIG. 21


(C)
6
7
1b
19
20
21
18
1
2
1a
5a
5
3
4
49
6i

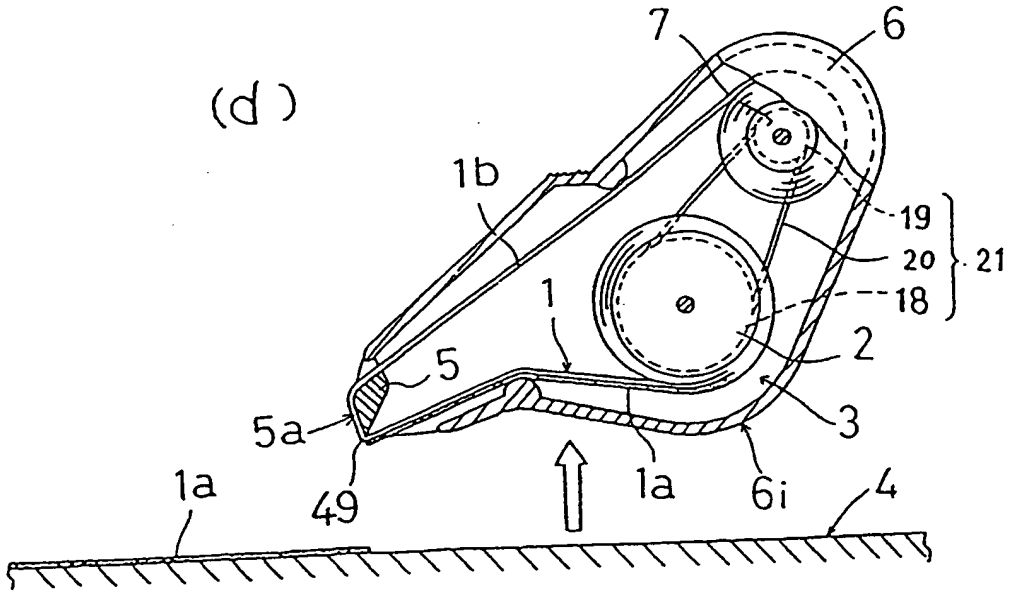

(d)
7
6
1b
19
20
21
18
1
2
5
3
5a
1a
49
1a
6i
4

FIG. 22

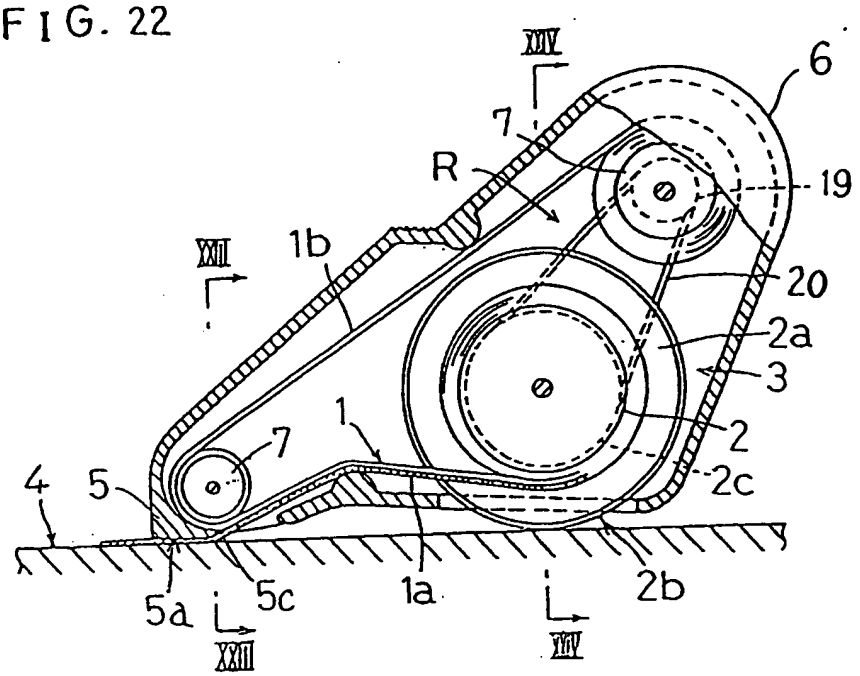


FIG. 23

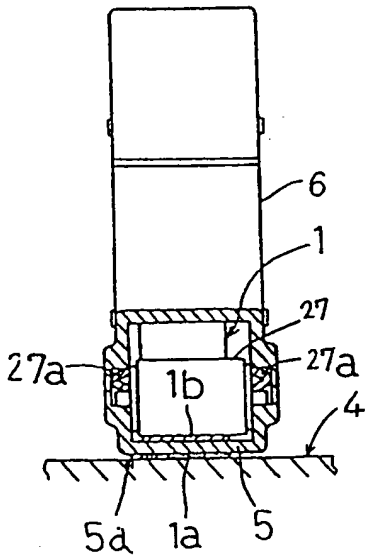


FIG. 24

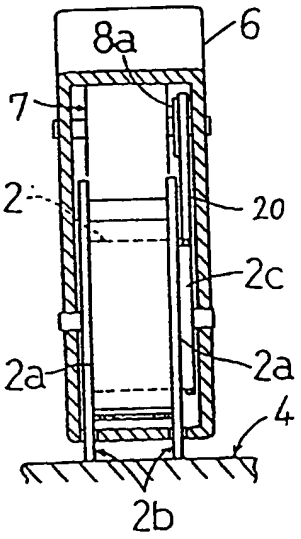


FIG. 25

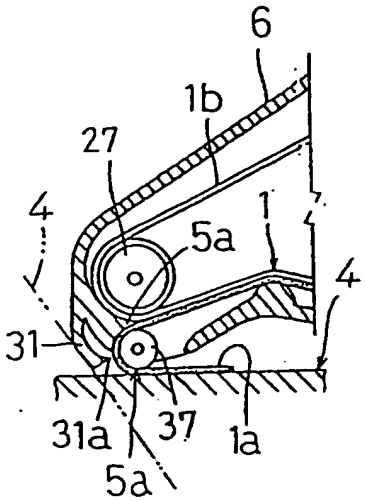


FIG. 27

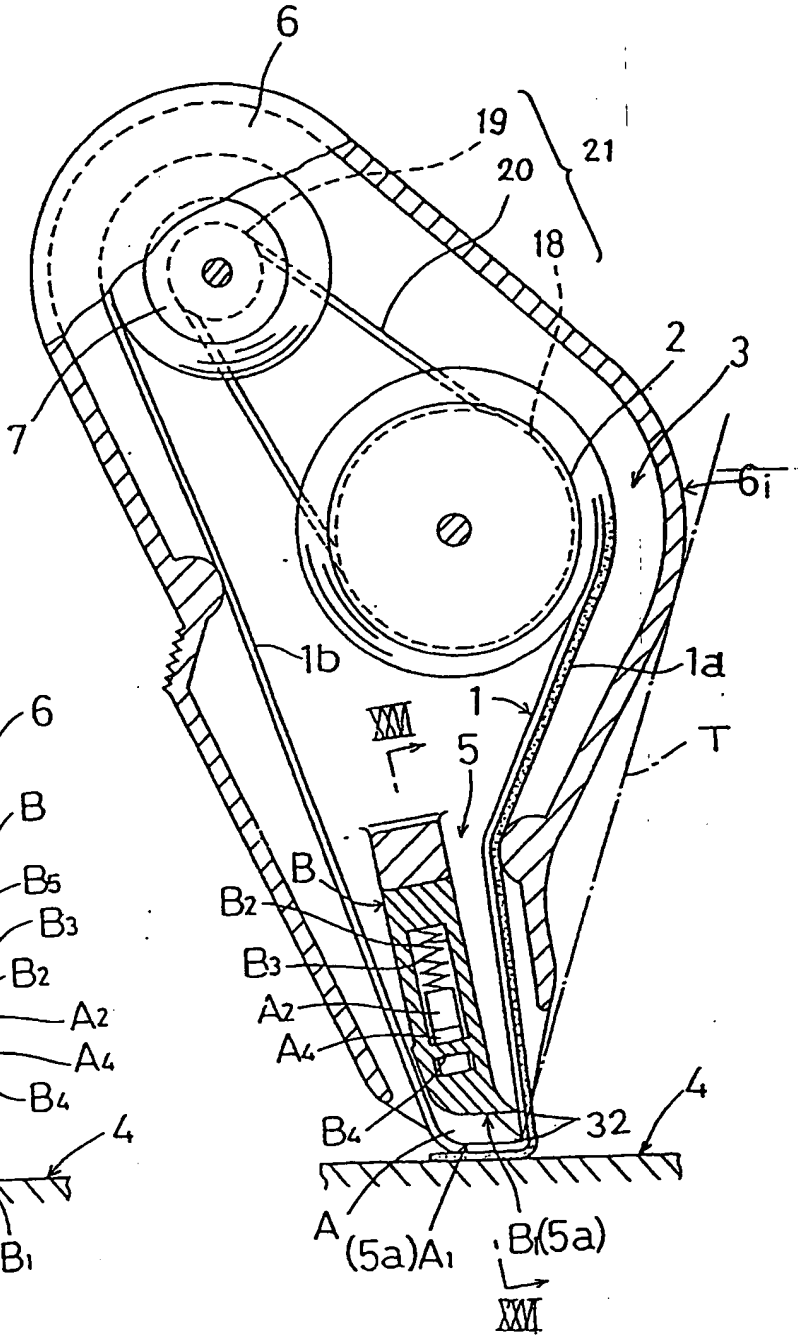

6
19
20
21
18
2
3
7
6i
1b
1a
1
T
5
B
B2
B3
A2
A4
B4
32
4
A
(5a)A1
B1(5a)
XXVI
XXVI

FIG. 26

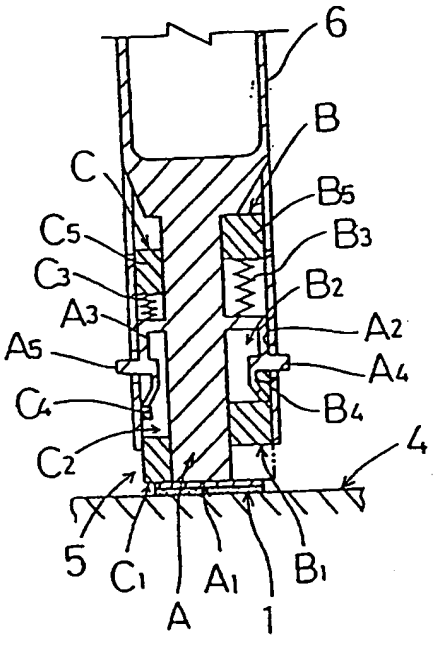

6
B
C
B5
C5
B3
C3
B2
A3
A2
A5
A4
C4
B4
C2
4
5
C1
A
A1
1
B1

FIG. 28

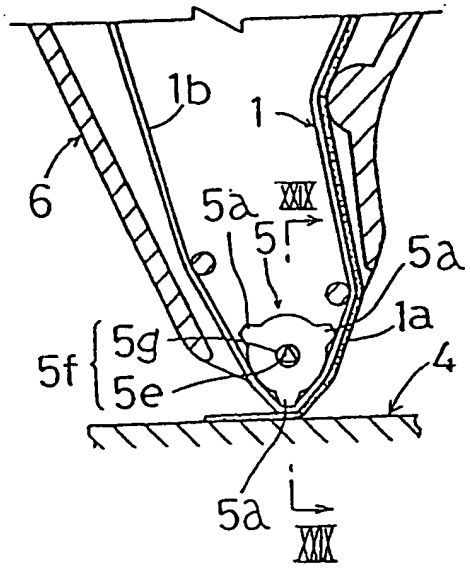


FIG. 29

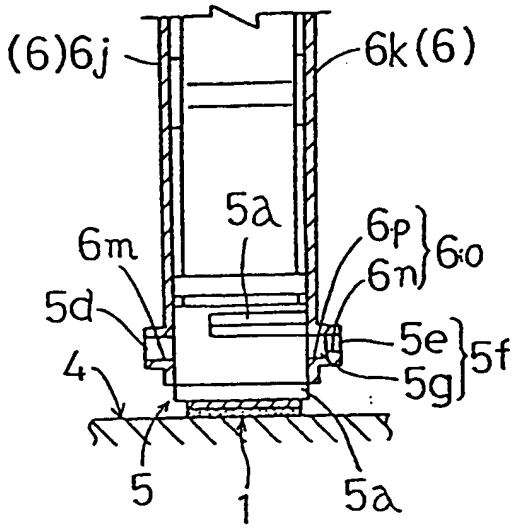


FIG. 30

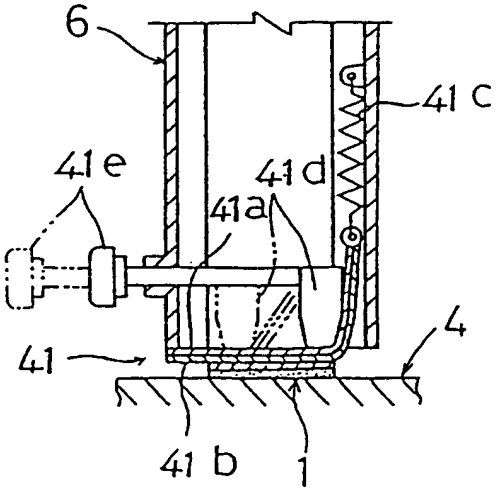


FIG. 31

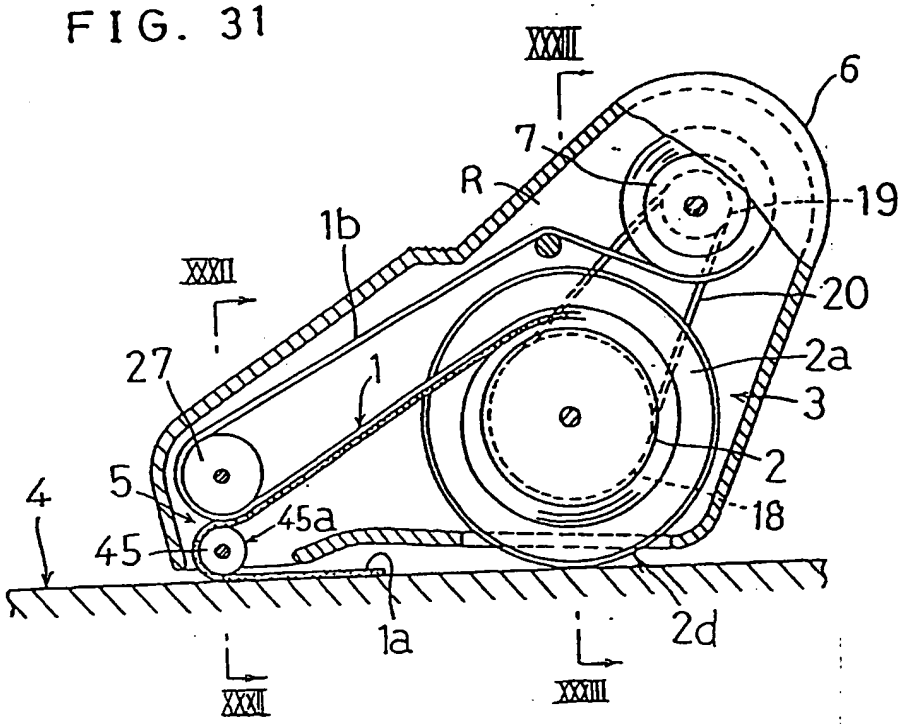


FIG. 32

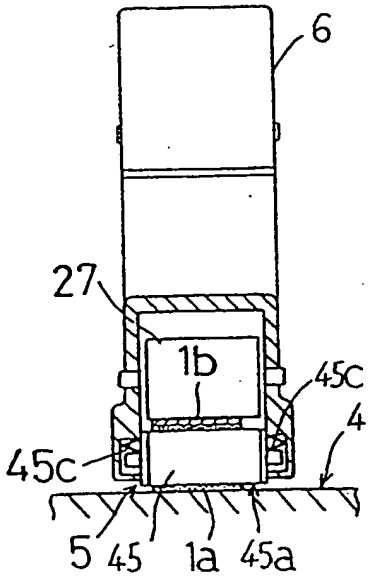


FIG. 33

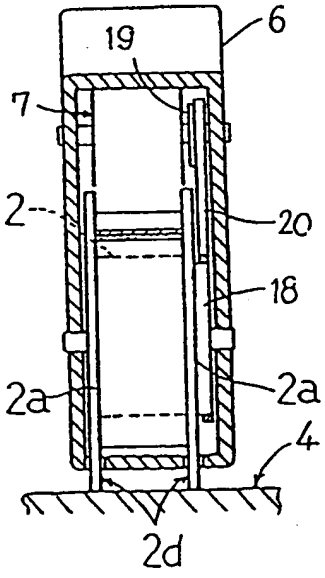


FIG. 34

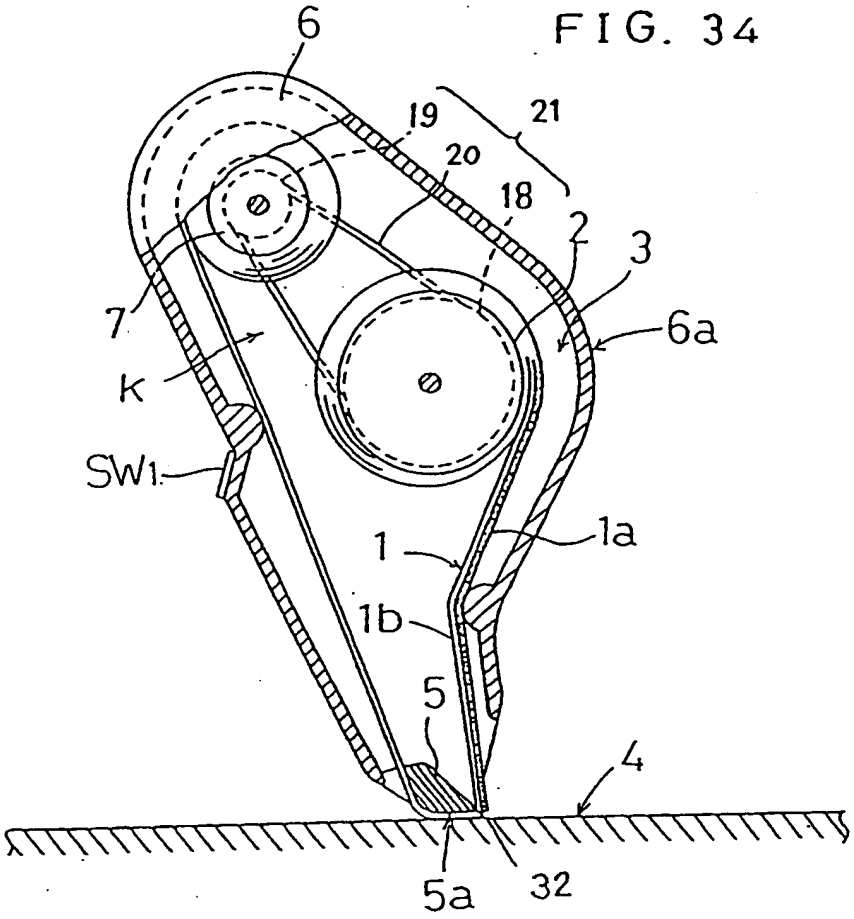


FIG. 35

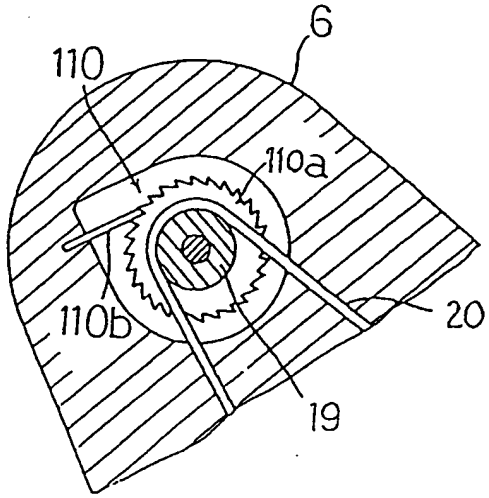
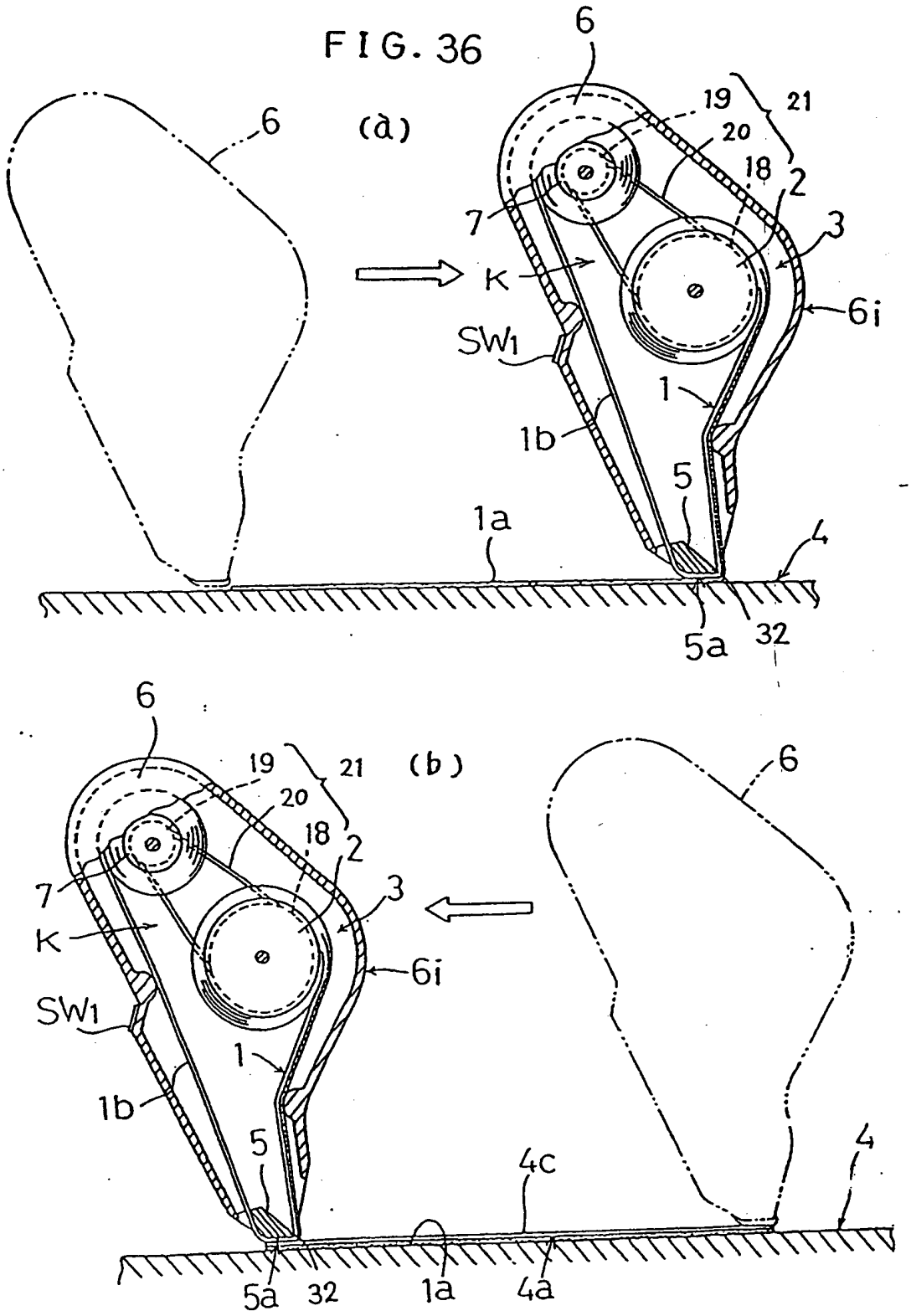


FIG. 36


(a)
6
19
21
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18
2
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3
K
6i
SW1
1
1b
5
1a
4
5a
32
(b)
6
19
21
20
18
2
7
3
K
6i
SW1
1
1b
5
4c
4
5a
32
1a
4a

FIG. 37

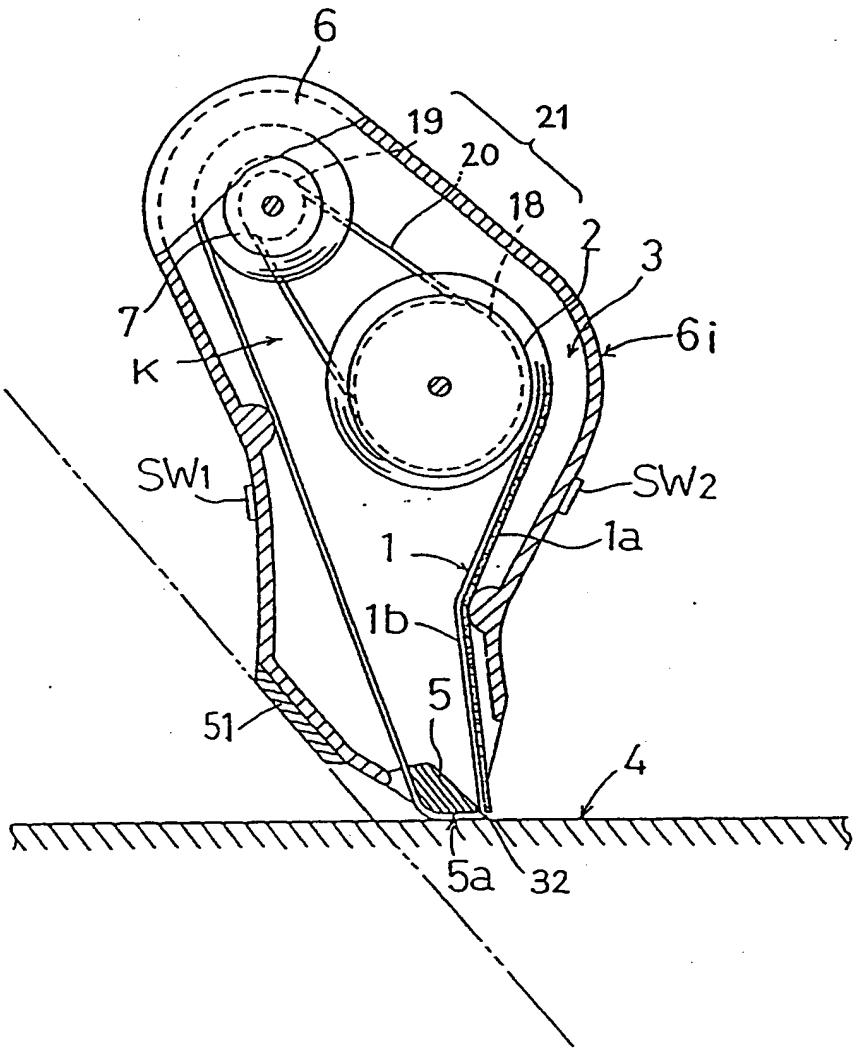


FIG. 38

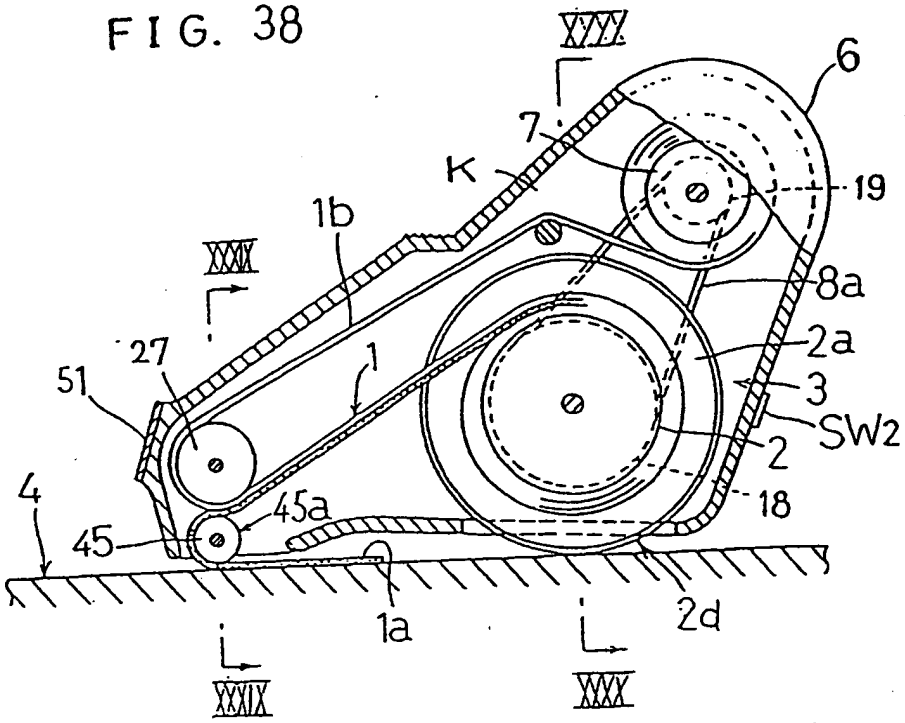


FIG. 39

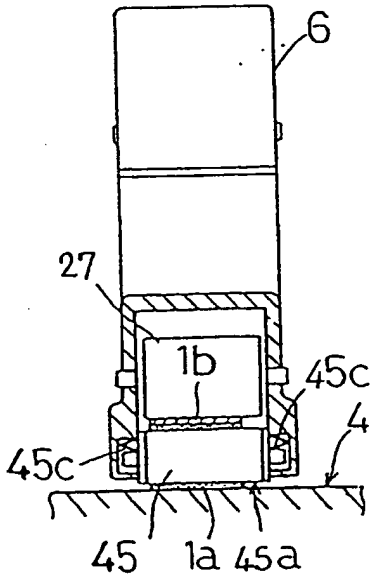


FIG. 40

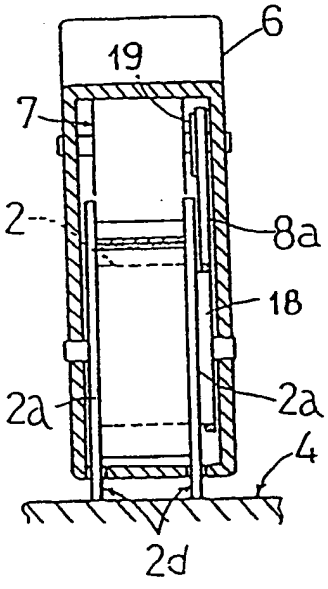


FIG. 41

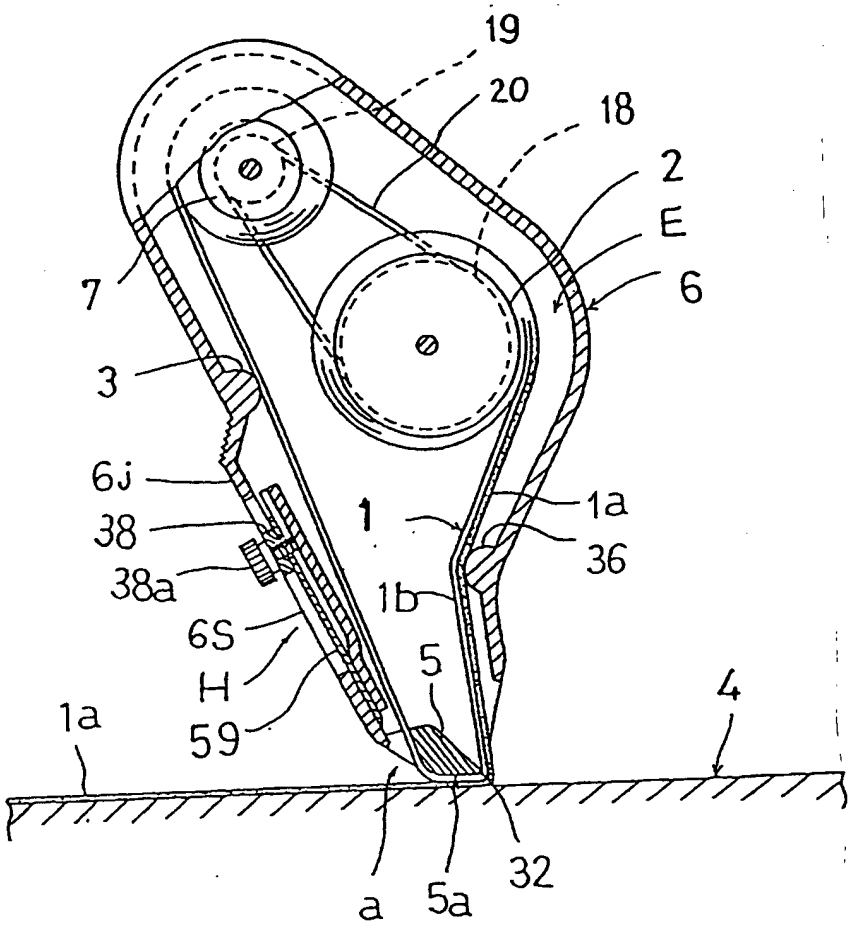

19
20
18
2
E
6
7
3
6j
38
38a
6S
H
59
1
1a
36
1b
5
4
1a
a
5a
32

FIG. 42

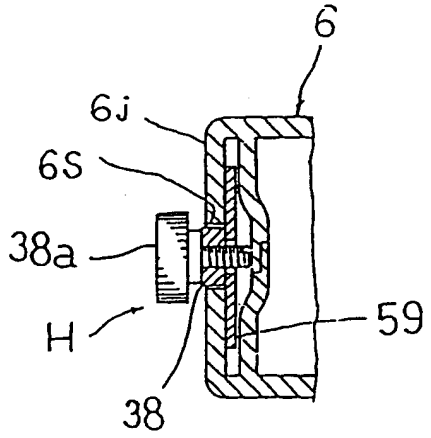

6
6j
6S
38a
H
59
38

FIG. 43

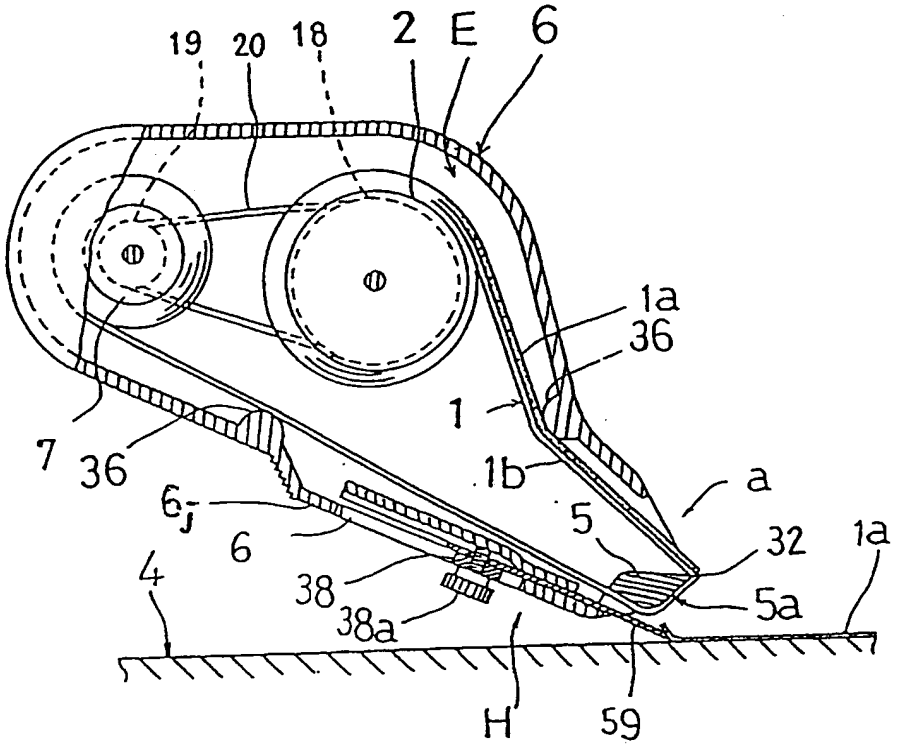


FIG. 44

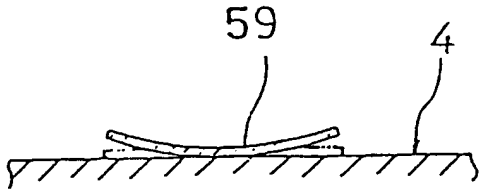


FIG. 45

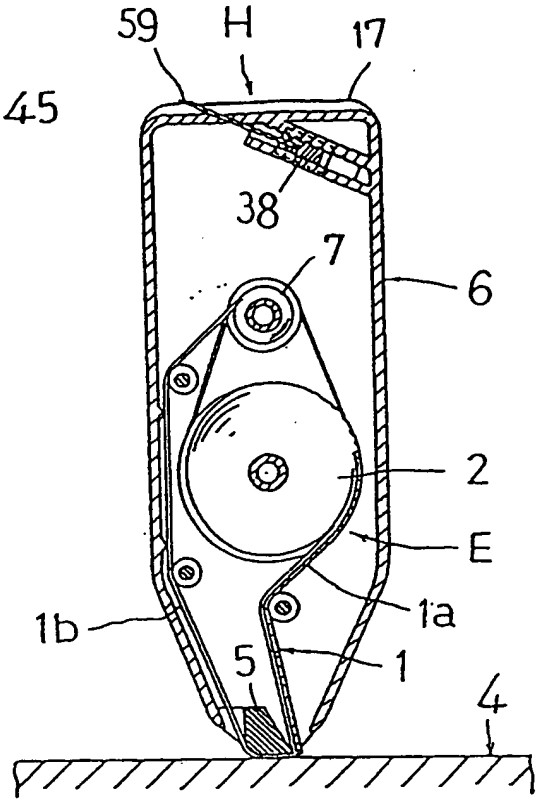


FIG. 46

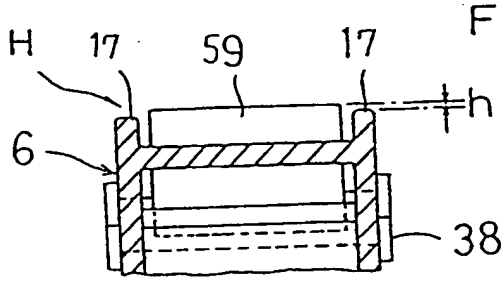


FIG. 47

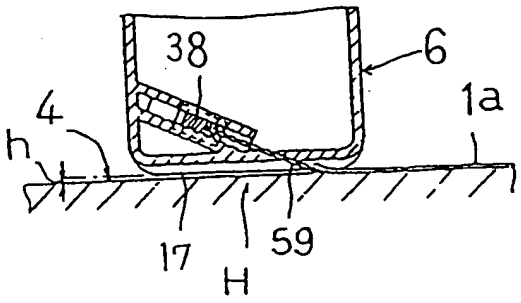


FIG. 48

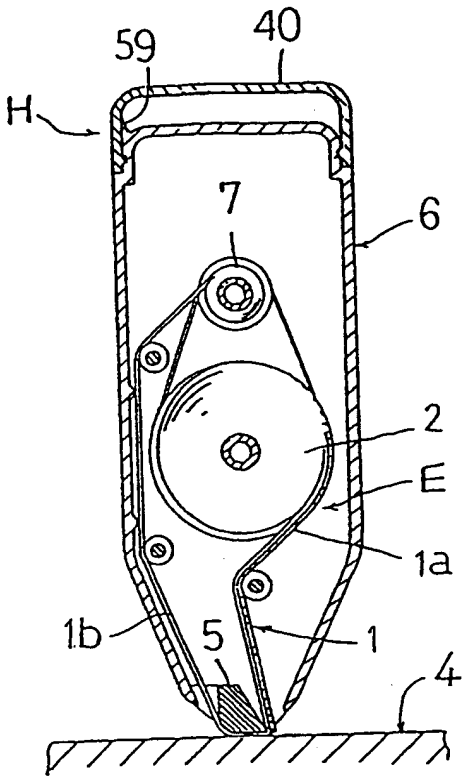


FIG. 49

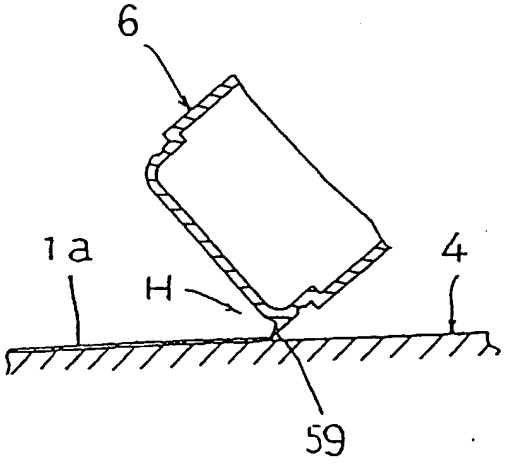


FIG. 50

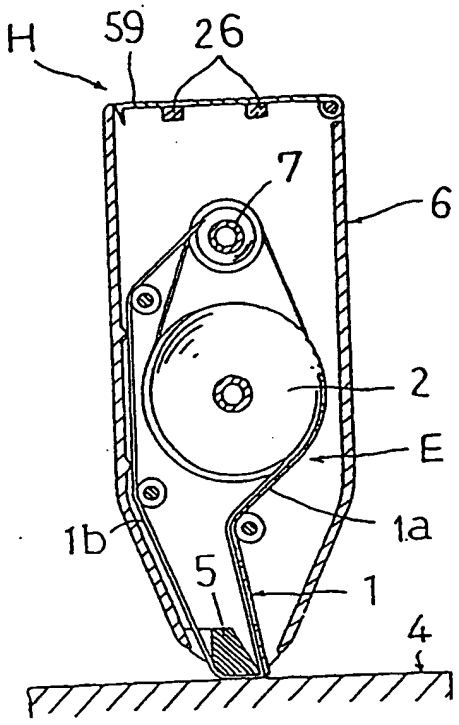


FIG. 51

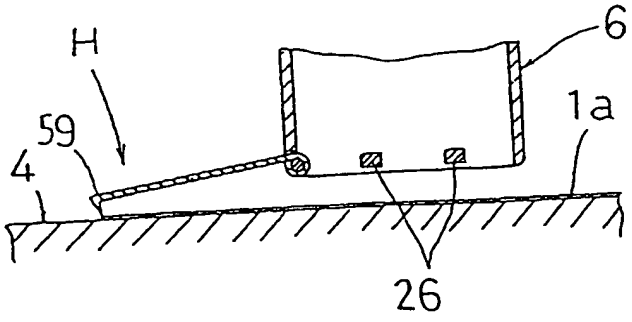


FIG. 52

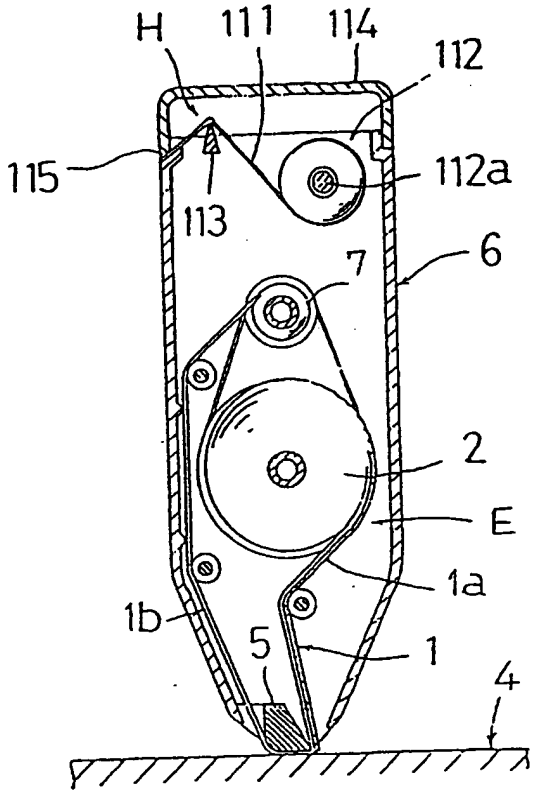

H
111
114
112
115
113
112a
6
7
2
E
1a
1b
5
1
4

FIG. 53

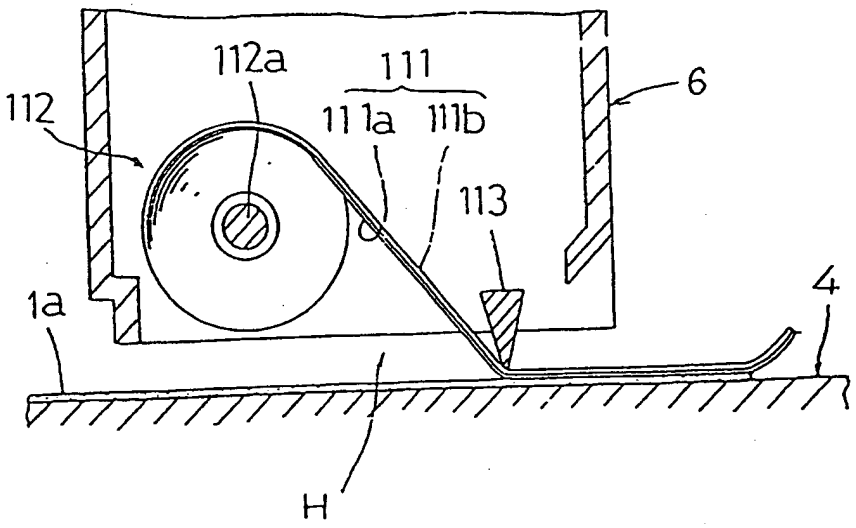

112a
111
6
112
111a
111b
113
4
1a
H

FIG. 54

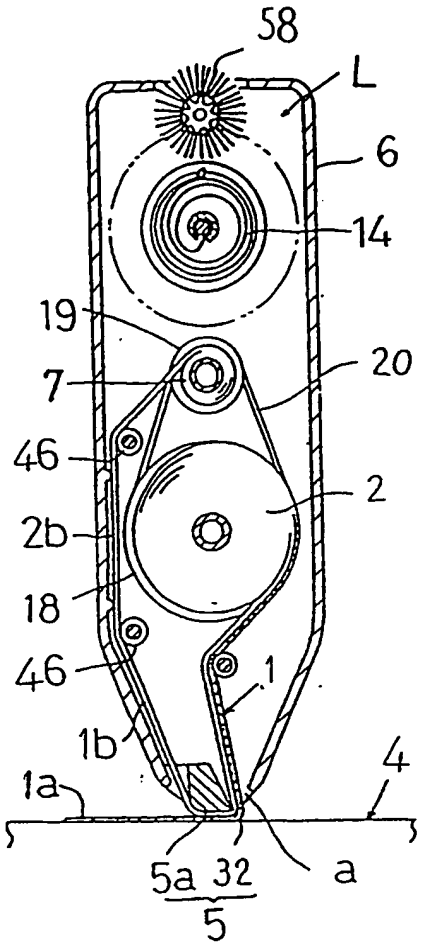


FIG. 55

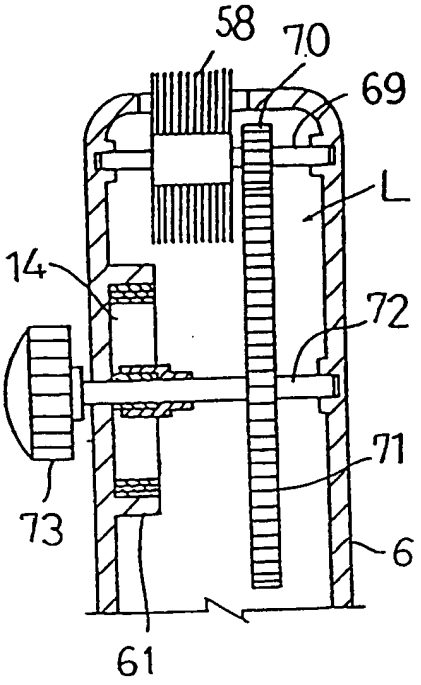


FIG. 56

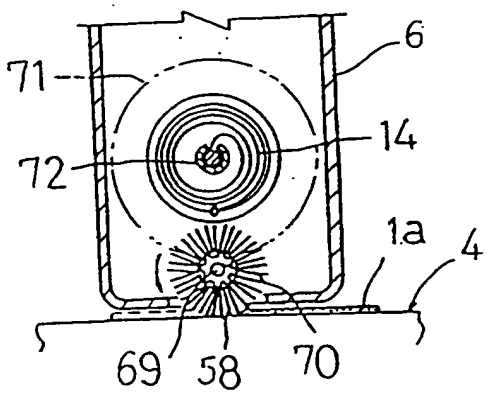


FIG. 57

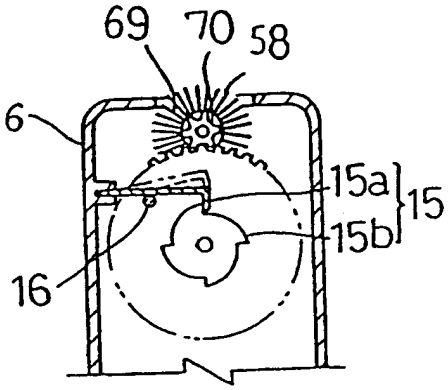


FIG. 58

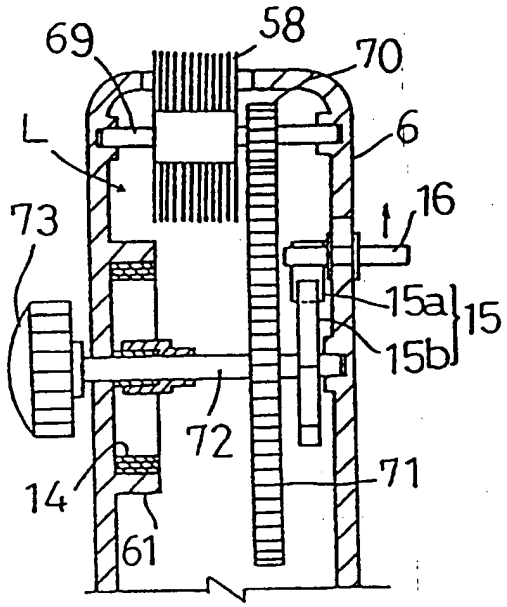


FIG. 59

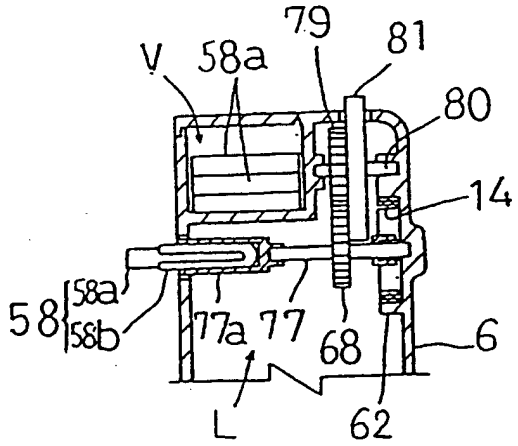


FIG. 60

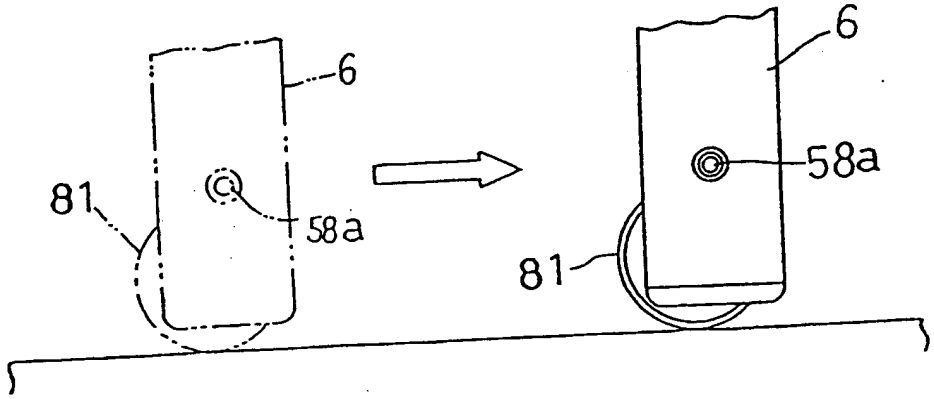


FIG. 61

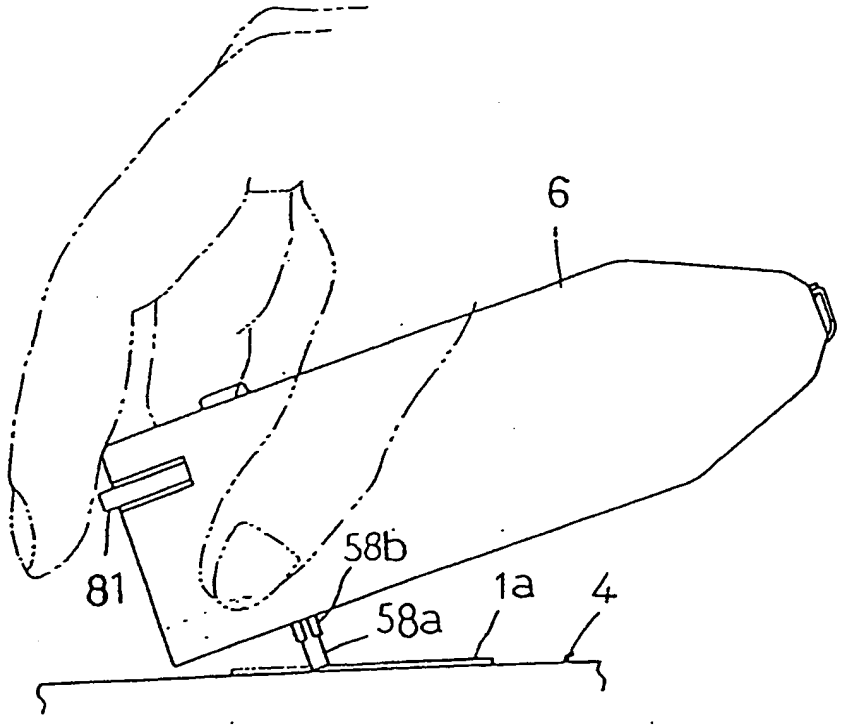


FIG. 62

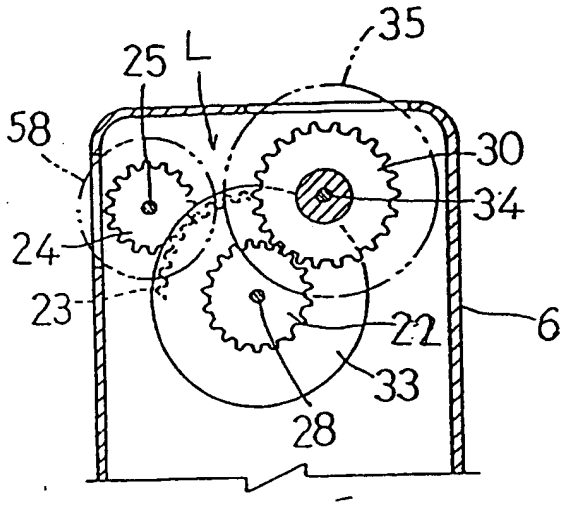


FIG. 63

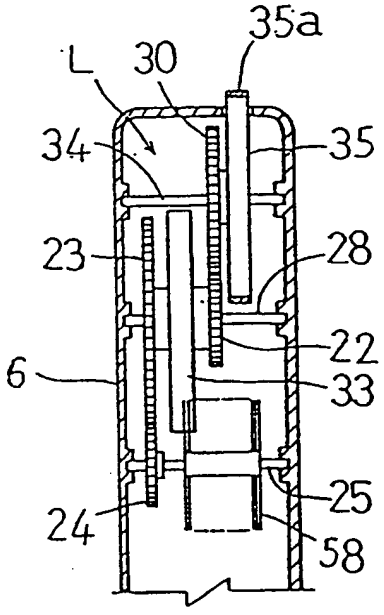


FIG. 64

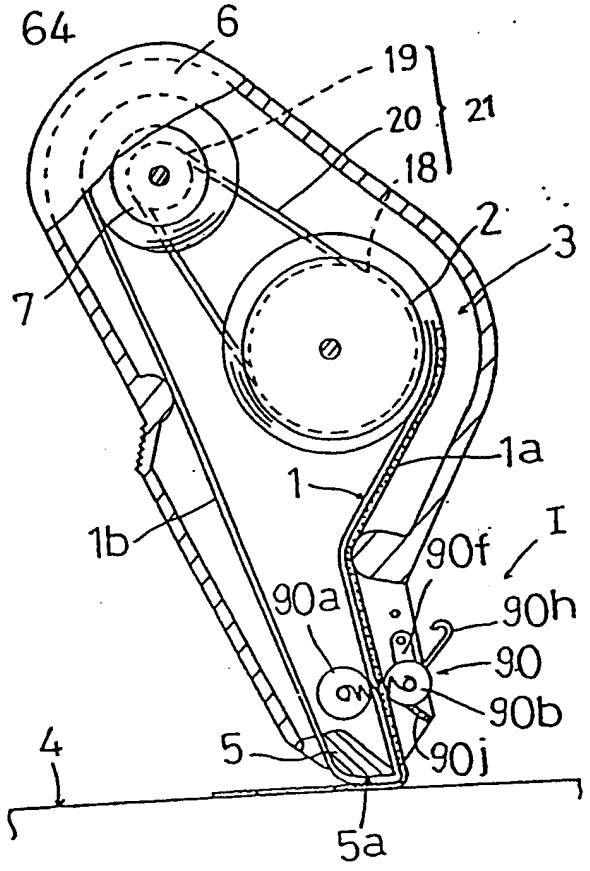


FIG. 65

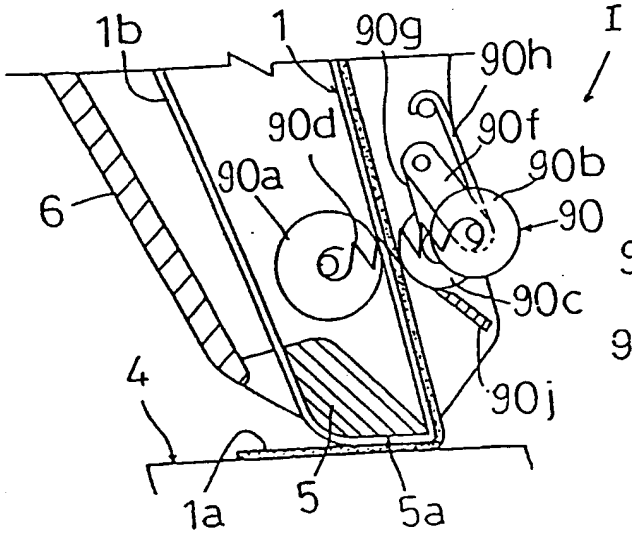


FIG. 66

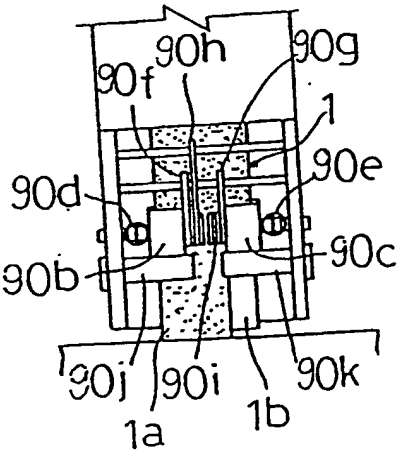


FIG. 67

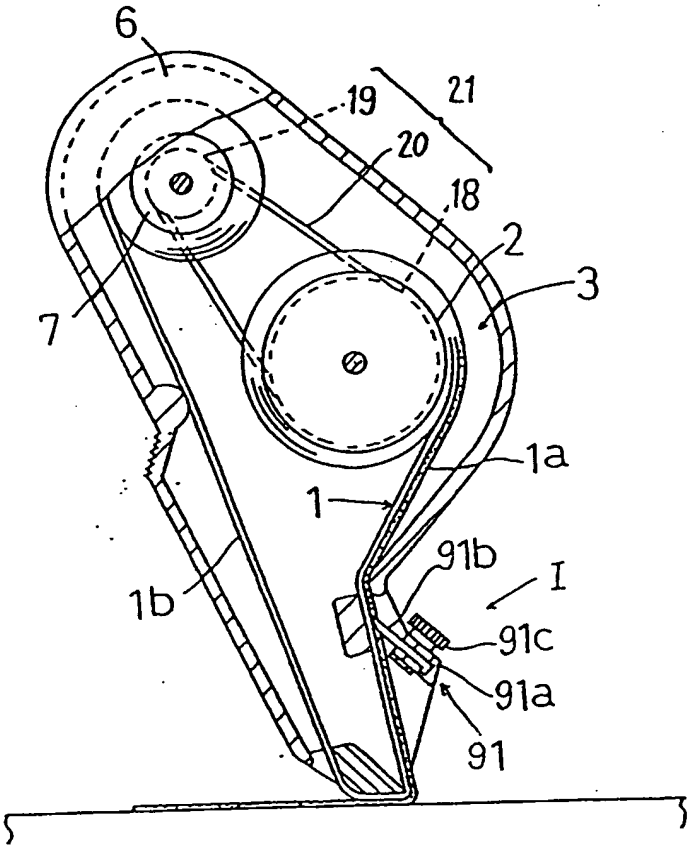
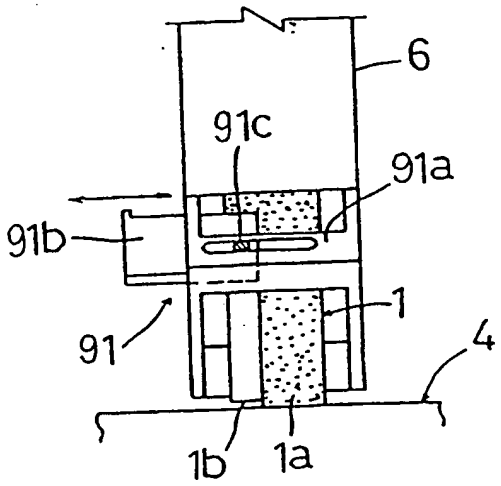


FIG. 68



INTERNATIONAL SEARCH REPORT

International Application No PCT/JP90/00634

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl[5] B65H35/07, 37/02

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC	B65H35/07, 37/02-37/04, C09J7/02

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

Jitsuyo Shinan Koho 1926 - 1989
Kokai Jitsuyo Shinan Koho 1971 - 1989

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	JP, Y2, 63-30769 (Toyo Chemical Co., Ltd.), 17 August 1988 (17. 08. 88), (Family: none)	1 - 11, 14 - 20
A	JP, Y2, 62-39001 (Toyo Chemical Co., Ltd.), 5 October 1987 (05. 10. 87), (Family: none)	1 - 11, 14 - 20
A	JP, Y1, 47-11840 (Soyo Kagaku Kogyo K.K.), 1 May 1972 (01. 05. 72), (Family: none)	3
A	JP, B2, 54-19838 (Toyo Chemical Co., Ltd.), 18 July 1979 (18. 07. 79), (Family: none)	3
A	JP, Y2, 55-513 (Aiwa Co., Ltd.), 9 January 1980 (09. 01. 80), (Family: none)	4, 6 - 10
A	JP, B2, 58-3945 (Nagoya Yukagaku Kogyo K.K.),	5

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
July 11, 1990 (11. 07. 90)	July 30, 1990 (30. 07. 90)
International Searching Authority	**Signature of Authorized Officer**
Japanese Patent Office	

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

	24 January 1983 (24. 01. 83), (Family: none)	
A	JP, A, 63-12416 (Murata Mfg. Co., Ltd.), 19 January 1988 (19. 01. 88), (Family: none)	12 - 13
A	JP, A, 63-230475 (Toshiba Corp.), 26 September 1988 (26. 09. 88), (Family: none)	12 - 13
A	JP, Y2, 52-10709 (Towa K.K.), 8 March 1977 (08. 03. 77), (Family: none)	14 - 20

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [1]

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers ... , because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim numbers ... , because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers ... ..., because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [2]

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.